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Improving Sustainability of Transport Services

- Case Stora Enso Ltd.

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ABSTRACT

As global competition is extending from individual company level to supply chain level, manufacturing companies are partly carrying the risk of their suppliers' performance. Therefore, companies are beginning to expand sustainability requirements to their transport chains.

This thesis examines how a manufacturing company can improve the sustainability of its transport services. The thesis concentrates more on environmental and social responsibility aspects rather than economical aspects of sustainability or evaluation of environmental effects. It considers the methods that companies could use to commit their suppliers to collaboration and to monitor that joint rules are followed. The thesis also describes how sustainability can affect change management that aims to improve the performance of transport services. Guidelines are given on how companies can measure and estimate the sustainability performance of their suppliers. The study synthesises the most relevant aspects of sustainability improvement process and provides a framework for supplier categorisation that companies can use when improving sustainability of their transport chains. The framework of the thesis is adapted to the transport chain of the case company Stora Enso. The information within the case study was gathered from interviews of transport managers as well as questionnaires sent to the suppliers.

To increase the effect of a sustainability improvement process, the methods of sustainability management should apply in some fashion to every logistics service provider. Suppliers should be categorised on the basis of transport mode and level of maturity in the area of sustainability management. These groups should then be managed as separate entities to ease the change management. The sustainability requirements should be tailored to meet the unique features of each group. Manufacturing companies should increase their visibility towards suppliers in order to build trust and commitment, which often leads to better performance. The sustainability measurement system should be included in existing supplier evaluation systems and they should form an essential part of the decision making process when renegotiating contracts. The main contribution of the thesis is an assessment method that includes guidelines, assessment forms, and a categorisation tool that helps the company to classify its suppliers into appropriate groups as well as helps the purchasing managers to estimate sustainability performance of the suppliers.

To efficiently but realistically launch the improvement project, Stora Enso should include sustainability aspect to contract negotiation process and give the suppliers concrete requirements. The company should commit the suppliers to improvements by promising more business to those who fulfil the targets and enhancing collaboration with them. Stora Enso should also allocate some resources for the improvement process as well as unify the logistics processes between and inside the countries.

Key words: transport services, supply chain development, collaboration, sustainability
Total number of pages: 114

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Kestävän toiminnan kehittäminen kuljetuspalveluissa – Case Stora Enso Oyj

TIIVISTELMÄ

Yksittäisten yritysten välisen kilpailun laajetessa toimitusketjujen väliseksi kilpailuksi puutteet kuljetusalihankkijoiden toiminnassa heijastuvat riskinä teollisuusyritysten maineelle. Teollisuusyritykset ovatkin alkaneet asettaa yritysvastuuvaatimuksia myös kuljetusalihankkijoilleen.

Tutkielmassa tarkastellaan, kuinka teollisuusyritykset voivat kehittää kuljetusketjujensa kestävää liiketoimintaa eli yritysvastuuta. Tutkimuksessa keskitytään yritysvastuun ympäristölliseen ja sosiaaliseen puoleen, ei niinkään ympäristövaikutusten arviointiin tai yritysvastuun taloudelliseen näkökulmaan. Tutkimus käsittelee keinoja, joilla teollisuusyhtiöt voisivat sitouttaa alihankkijoita yhteistyöhön ja valvoa, että alihankkijat noudattavat niiden asettamia yritysvastuuvaatimuksia. Lisäksi tarkastellaan erityispiirteitä, joita yritysvastuunäkökulma aiheuttaa kuljetusketjun toiminnan parantamiseen tähtäävälle muutosjohtamiselle sekä annetaan suosituksia alihankkijoiden yritysvastuutoiminnan mittaamiseen ja arviointiin. Tutkimustavoitteena on koota yhteen tärkeimmät yritysvastuukehitysprosessiin vaikuttavat tekijät sekä tarjota alihankkijoiden luokitteluun viitekehys, jota teollisuusyritykset voisivat käyttää kuljetuspalveluidensa yritysvastuun kehittämisessä. Tutkielman viitekehystä sovelletaan case-yritys Stora Enson kuljetusketjuun. Case-tutkimukseen tarvittavat tiedot on kerätty alihankkijoille lähetetyillä kyselylomakkeilla sekä haastattelemalla kuljetusjohtajia.

Tuotantoyrityksen yritysvastuutavoitteiden tulisi näkyä jokaiselle logistiikkapalvelun tarjoajalle, jotta yritysvastuun kehittämisprosessi tehostuisi. Muutosprosessin johtamisen helpottamiseksi alihankkijat tulisi kuljetusmuodon ja yritysvastuukokemuksen perusteella jaotella ryhmiin, joita käsitellään kokonaisuuksina. Alihankkijaryhmille annetaan yritysvastuutavoitteet, jotka räätälöidään ryhmän erityispiirteisiin sopiviksi. Teollisuusyritysten tulisi lisätä läpinäkyvyyttä alihankkijoitaan kohtaan luodakseen luottamusta ja yhteistyöhön sitoutumista, sillä nämä johtavat usein parempaan toimintaan. Yritysvastuun mittausjärjestelmä tulisi sisällyttää yrityksen olemassa oleviin alihankkijoiden toiminnanmittausjärjestelmiin ja tulokset tulisi huomioida sopimusneuvotteluissa. Tutkielman lopputuloksena on arviointimenetelmä, johon kuuluu ohjeita, alihankkijoiden yritysvastuutoiminnan arviointilomakkeet sekä päätöksentekoa tukeva työkalu, jota ostajat voivat käyttää alihankkijoiden luokitteluun ja kestävän toiminnan arviointiin.

Yritysvastuuprojektin tehokkaan mutta realistisen toteuttamisen varmistamiseksi Stora Enson tulisi sisällyttää yritysvastuunäkökulma sopimusneuvottelujen päätöskriteeriksi ja pitää alihankkijoiden muutosvaatimukset yksinkertaisina. Alihankkijat tulisi sitouttaa muutokseen lupauksilla yhteistyön jatkumisesta ja paranemisesta. Stora Enson tulisi myös osoittaa resursseja kehitysprosessille ja yhtenäistää logistiikkaprosesseja sekä maiden sisällä että maiden välillä.

Avainsanat: kuljetuspalvelut, toimitusketjun kehittäminen, yhteistyö, kestävä toiminta
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Kaisa Eronen

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1 Introduction

Investors and other interest groups are ever increasingly demanding companies to develop their environmental and corporate social responsibility programmes. A company's well-managed ethical performance towards environment and society can become a significant competitive advantage. Some companies have indeed put prominent efforts on improving their corporate brand with efficient ethical performance and information.

Most of the manufacturing companies have outsourced their transport activities. Although manufacturing companies themselves would have taken a good care of their environmental and corporate social responsibility programmes, independent transport companies may not follow the same principles in their operations. If a supplier's performance conflicts with the values and performance of a manufacturing company, their performance can also violate a manufacturing company's brand.

1.1 Background of the Study

A single manufacturing company may feel itself rather powerless in the present ever-tightening competition environment. Competition is primarily held between supply chains, and the traditional way of competing between single companies is fading. Although the products of a manufacturing company would be excellent, the company cannot satisfy its service level expectations if it is not able to arrange reliable deliveries. Hence, efficient supply chain management and collaboration are becoming prerequisites for prospering in the business. This brings companies to new challenges when developing existing supply chain management practises and creating completely new supplier collaboration models. Companies are forced to pay a special attention to their supply chain performance.

So far, companies' collaboration and supply chain performance development efforts have primarily concentrated on improving stock control, quality and delivery reliability as well as decreasing demand uncertainty. It seems that companies have encountered growing environmental and social responsibility demands on their own. However, several cases have shown that companies should improve their collaboration also in the field of sustainability to secure their brand and reputation. Finland's worst road accident in Konginkangas gave a significant pre-alert to Finnish markets in 2004: The truck that hit the buss was transporting

paper reels from paper mill to Sompasaari harbour in Helsinki. The public debate after the accident handled rather often the forest company that owned the paper reels even though the truck was owned by a separate transport company. Important issues in the discussion were, for example, the expediency of heavy road transports, general defaults in load binding, transgressions of drivers' working hours, and technical features of vehicles (Piispa 2004, 4). In addition, the Finnish market was blamed for its efficiency requirements and competition pressures as impairing traffic security. Although both the forest company and its transport supplier were found blameless for this accident, the general public had already begun criticising heavy road transports. And even though the forest company was not directly an accident party, consider what would have happened to its brand and reputation in the following case: the truck would have been speeding because of tight schedules caused by manufacturing problems, the driver could not have had his legal breaks, and due to cost savings the driver would not have been able to bind the load with safety nets.

The purpose of the previous example is to illustrate the importance of supply chain collaboration for a manufacturing company also in environment and sustainability questions. Companies should consider how much other supply chain members are able to damage their brand with unethical performance and make plans to prevent this. The best way to avoid nasty revelations is to agree on common principles of performance that should be adhered to. Companies can also gain competitive advantage through collaboration within the supply chain in questions of environmental and social responsibility in various ways:

- Supply chain members know each others' sustainability performance and thus know the strengths and weaknesses of the chain
- Members meet and often even exceed the ever-tightening sustainability demands
- Members are able to improve their performance on their own pace already well before the changes are compulsory
- Members are able to offer more ethical products to ethical investors than manufacturing companies without collaborative supply chains

When a manufacturing company wants to develop the environmental and corporate social responsibility performance of its transport chain in collaboration with other chain members, it faces many difficult problems, such as how the company could commit its suppliers to continuous improvement? Should suppliers be treated similarly despite their differences in sizes and readiness for change? How should suppliers' performance in corporate social responsibility

be measured? Should achievements be awarded or defaults punished? These questions illustrate the scope of systematic assessment and policy addressed in this thesis.

The empirical part of this thesis examines a forest company Stora Enso Ltd and its transport chain. The case company has paid much attention to environmental and social responsibility values and has also changed its performance towards more sustainable direction. When observing the suppliers, Stora Enso has realised that its huge transport supplier network has a variety of different attitudes and ways of action towards sustainable values. Thus, the risk of the company's reputation being affected by its suppliers' performance is real. In addition to the possible risk for the brand, well-managed environmental and corporate social responsibility operations are "the right thing to do" (Nordell 20.1.2005). This is why Stora Enso is about to launch the sustainability project for its transport suppliers. One objective of this thesis is to support and give recommendations for Stora Enso in this project.

As the real business life, the literature of supply chain development and collaborative supply chains has primarily focused on order handling, inventory control, and quality problems. Most of the studies examine, for instance, how bull-whip effect can be reduced with efficient supply chain management, how a supply chain can respond to demand fluctuations as efficiently as possible, or how it can evolve information sharing between supply chain members etc. Many of these studies concentrate purely on the means of enhancing the performance and give little attention to members' commitment to the supply chain and actual change management that would give some concrete guidelines on how companies could execute the development process. However, when the targets of a supply chain are not demand-related, these issues play important role in a change process.

1.2 Research Problem and Objectives

This research examines how a manufacturing company can improve collaboration with logistics service providers. The main research problem is **how a manufacturing company can improve sustainability of its transport services by enhancing collaboration and commitment to joint targets among suppliers**. The purpose is to examine what incentives could be used to commit suppliers to collaboration, how a manufacturing company could monitor that joint rules are followed and how sustainability aspect affects on the change management that aims to improve the performance of a transport chain. A natural precondition for enhancing collaboration is that a manufacturing company is able to measure its suppliers' environmental and social responsibility performance in the beginning of the process and estimate their development during the

collaboration. Thus, a significant issue addressed in this research is how a manufacturing company can measure the sustainability performance of its suppliers.

It is hypothesised that different transport supplier groups need different guiding methods due to the special features of transport mode and the size of a logistics service provider. Furthermore, it may be easier to improve collaboration with small and local transport companies than with medium-sized and large companies because of a stronger dependence of smaller companies to the principal. Yet, large transport companies could already be much more developed in their environmental and social responsibility activities. Thus, the objectives of this study are:

1) To synthesise the most relevant sustainability and management aspects of improving the sustainability performance of a transport chain as well as to create a framework for supplier categorisation that manufacturing companies could use in their improvement processes
2) To analyse Stora Enso's transport chain and find alternatives for improving its sustainability
3) To introduce a categorisation tool for classifying transport suppliers as well as to give recommendations on how these supplier groups should be managed and how their sustainability performance could be measured

The analysis of the most relevant sustainability and improvement aspects forms the skeleton of this thesis. To examine how a manufacturing company could improve the sustainability performance of its transport chain, it is needed to define the most important sustainability aspects that should be taken into consideration in this change process as well as the management aspects that lead to better collaboration and improvements. The first objective also aims to draft a classification that could be used as a basis of sustainability development processes when a manufacturing company has number of diverse transport suppliers with different change readiness for sustainability improvements. The classification will be used as a basis for performance indicators and incentive recommendations. The second objective relates to an empirical part of the thesis. The intention is to apply the categorisation framework to Stora Enso's large and challenging transport environment. Finally, the third objective aims to develop a categorisation tool that could be utilised when dividing suppliers into different groups. The tool estimates the sustainability performance of a supplier and then shows the decision-maker to which group the supplier belongs. Another aim of the categorisation tool is to show whether these groups should be treated in different ways and whether there are differences between the sustainability performances of the transport modes. This tool has been developed for Stora Enso, yet, it is applicable to other manufacturing companies as well due to its general nature.

1.3 Research Approach

This thesis is a case study, and it bases on a qualitative approach. The qualitative approach suits best for this study, since the purpose is to observe the interdependencies between the transport chain members. The material for the empirical part is gathered from the case company's supplier records, from the meetings of transport service purchasers and from the interviews of logistics managers. The supplier classification in the empirical part is done on the basis of a questionnaire for Stora Enso's transport suppliers.

Because of the study's viewpoint, this thesis uses the term *supply chain* as a synonym for a *transport chain*. The transport chain in the empirical part begins from the paper mill gate and is viewed until European ports or the hub port in Gothenburg that passes end products ahead to the other continents. The study is limited to road, rail and sea transport. Air transport is not studied as such because it is not a typical transport mode of forest. The empirical part takes also domestic port operations under examination. The foreign port operations and land transport companies are left out due to their enormous amount but the framework is still applicable to them as well as to air transport.

This thesis is limited to deal only with indirect environmental and social aspects, i.e. the aspects that are not connected directly with a manufacturing company but are involved in its suppliers' operations.

The thesis deals with the concept of sustainability that can be divided into three dimensions: environmental-economic, social, and cultural. The study does not concentrate on the financial aspect of sustainability mainly as the cost cannot be directly allocated to manufacturing companies and as the intention is to encourage logistics service providers to develop their operations without significantly increasing the cost. This is due to the fact that customers of paper industry are not yet willing to pay extra for environmentally friendly transport (Syrjäläinen 1997, 58). However, the study realises that financial aspect is an essential part of decision making process.

The thesis is written from a manufacturing company's point of view and its purpose is to create a common framework for supplier categorisation that manufacturing companies could use when committing their transport chains to sustainability targets. The main focus is on enhancing the collaboration of a transport chain and improving change management that aims to improve the sustainability of transport chains. Hence, the intention is to concentrate more on supply chain co-

operation theories than pure green logistics theories or estimation of environmental effects. For example, the case company has already earlier defined precisely the sustainability aspects it observes in its own performance and now intends to monitor its suppliers' sustainability level.

The concept *change management* in thesis follows the definition of European Institute of Public Administration (2002, 27): "How the organisation manages, improves and develops its processes in order to innovate and support its policy and strategy and generate increasing value for its customers and other stakeholders". The purpose is, thus, to synthesise the most relevant aspects of the sustainability improvement process of a transport chain in order to ease the management and enable value creation for companies and their stakeholders.

1.4 Structure of the Study

This study begins with the introduction that presents the research problems and objectives, limitations, general study approach, and the most important definitions. Chapter 2 reviews supply chain management literature, supply chain collaboration and development efforts, performance metrics, as well as incentives. Finally it examines how the sustainability aspect affects on the supply chain management. The framework of the thesis is developed in the Chapter 3. The framework presents the classification for supplier grouping on the basis of their need for guidance, and gives recommendations for performance measurement and incentives. Chapter 4 presents the case company and examines its transport chain. The framework introduced in the Chapter 3 is used as a basis for analysis of the case company's supplier network and recommendations for suppliers' guidance. The last chapter includes the conclusions and suggestions for the possible future research themes.

1.5 Key Concepts

Corporate Social Responsibility, CSR
"Business' commitment to contribute to sustainable economic development, working with employees, their families, the local community, and society at large to improve their quality of life." (WBCSD 2005)
"Performance that caters for human rights, ethical business practises, communications, community involvement and reductions in workforce" (Stora Enso 2005b, 59)

Eco-Management and Audit Scheme (EMAS)
"An environmental management scheme for organisations operating in the European Union and the European Economic Area. It aims to promote continuous evaluation and improvements in the environmental performance of participating organisations." (European Commission 2005)

Hub-and-spoke network
Hub-and spoke refers to a network of nodes where some of the nodes serve as hubs. Flows are routed through one or more hubs before disseminating the goods to final destinations (spokes). (Elhedhli & Hu 2005, 1633)

Intermodalism
"Intermodalism refers to joint use of two or more transport modes" (Coyle et al. 2003, 153)

EN ISO 14001
The only certifiable environmental management standard developed by the International Standards Organisation (ISO). Other "members" of EN ISO 14000 series are considered as supporting guidelines of EN ISO 14001. EN ISO 14001 standard can bee seen as "a stepping stone for EMAS". (European Commission 2005)

Socially Responsible Buying
"The inclusion in purchasing decisions of the social issues advocated by organisational stakeholders" (Maignan et al. 2002, 642)

Sustainable development / Sustainability
"Sustainable development is globally, territorially, and locally constant and controlled change that aims at securing advantageous living prospects for the present and future generations. It consists of three functional dimensions: environmental-economic i.e. ecological, social and cultural dimensions." (Finnish UN Association 2005)

2 Improving the Performance of a Supply Chain

It is rather common that manufacturing companies have made lots of effort to improve their own sustainability in order to gain competitive edge. To maintain this competitive edge, manufacturing companies need to begin paying attention to the sustainability at a supply chain level as competition gets tighter and market requirements increase. However, it is much more complex to develop the performance of a supply chain than the performance of a company – although it is not easy to develop own operations either.

When improving the performance of a supply chain, one should first pay attention to the relationships between chain members as well as to the form of collaboration. In the past, companies could just concentrate on the first-tier suppliers whereas nowadays they need to extend the collaboration further (Kemppainen et al. 2003, 12). To best achieve the excellent performance in a supply chain, companies indeed need to consider thoroughly with whom and in which ways to collaborate and how to manage and control the performance of a supply chain.

A prerequisite for successful improvement programmes is participating members' commitment to collaboration. This is especially important in sustainability improvement programmes as the change leader also needs to influence the attitudes of the supply chain members. But one needs to remember that it is not possible to control or reward suppliers if one cannot measure their performance. Hence, it is necessary to define appropriate performance measures and systems that are jointly accepted in a supply chain. Improving the sustainability performance of a supply chain is not as easy as it may seem.

This chapter discusses first supply chain management, collaboration and development. After that, the thesis deals with performance measurement and the means for committing suppliers to sustainability programmes. Finally, the thesis examines what special requirements the sustainability viewpoint brings to supply chain collaboration.

2.1 Collaborating within Supply Chains

To study the literature on collaborative supply chain models, we need to define two concepts: what is a supply chain and what means supply chain management? Tsay et al. (1999, 299) have straightforwardly defined supply chain as "two or more parties linked by a flow of goods, information and funds." Bowersox et al. (1999, 16) have not seen supply chains as simple but

have brought out the importance of supply chain relationships in their definition: "Contemporary business operations reflect complex maze of relationships in which many different distributive arrangements may be simultaneously used to satisfy unique end-customer requirements."

Defining a concept supply chain management is not that easy since there does not exist any universally accepted definition. The concept has been divided into two different perspectives: 1) purchasing and supply management and 2) transport and logistics management (Tan et al. 1998, 3). Perhaps the most comprehensive definition of supply chain management is, however, outlined by the Council of Supply Chain Management Professionals (CSCMP, 2005):

> *"Supply Chain Management encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all Logistics Management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third-party service providers, and customers. In essence, Supply Chain Management integrates supply and demand management within and across companies."*

Bowersox et al. (1999, 6) have developed a somewhat simpler definition for supply chain management that could be easier to use in everyday business: "a collaborative-based strategy to link inter-organisational business operations to achieve a shared market opportunity."

The concepts *supply chain management* and *supply chain collaboration* are often confused and even used as synonyms with one another. The supply chain management definition introduced by Bowersox et al. reminds indeed the definition of collaborative supply chain suggested by Simatupang and Sridharan (2002, 19). According to them, "a collaborative supply chain simply means that two or more independent companies work jointly to plan and execute supply chain operations with greater success than when acting in isolation". However, as outlined by the Council of Supply Chain Management Professionals (CSCMP) supply chain management is generally seen as the larger concept that includes supply chain collaboration. Hence, supply chain management is seen as too extensive concept and this thesis concentrates purely on supply chain collaboration theories. The thesis comprehends supply chain collaboration similarly with the above definition.

2.1.1 Basic Prerequisites for Successful Collaboration

When a company aims to improve its supply chain performance, it also needs to evolve the relationships between chain members. If changes are planned in unison, it is more likely that the

chain members do commit to them and adopt the new guidelines. This is an essential prerequisite for a successful supply chain improvement programme.

Enhancing collaboration in a supply chain means significant sacrifices from executive organisations. Relationship integration requires cross-organisational behaviour that can be supported by creating appropriate structures, frameworks, and metrics (Bowersox et al. 1999, 105). This means that firms need to share planning and operational information as well as create financial linkages between each other in order to create dependencies on collaboration. Because of the amount of resources supply chain collaboration improvements require it is generally recommended that buying firms reduce their amount of suppliers. When the number of suppliers is manageable, it is substantially easier to coordinate chain's performance. However, it can also be argued that it is not always possible to make significant supplier reductions. In these situations it would help if a company could create a supplier classification to guide the change management.

If a company wants to concentrate its collaboration efforts on limited number of suppliers, it may face difficulties in choosing suitable partners. According to Kemppainen et al. (2003, 39), the preconditions for successful collaboration are information sharing, co-ordination and incentive alignment. Bowersox et al. (1999, 64) emphasise somewhat different aspects. According to them, the most basic requirement for successful collaboration is a common vision of the value-creation process. Partners need to share a common vision and understanding of service, internal process integration, segmental logistics, incentives, and innovation. As Kemppainen et al., also Bowersox et al. state that corporate culture must be supportive and partners need to be committed to information exchange. Finally, partners need to have commonly accepted strategy to achieve best possible performance. Bowersox et al. claim that if above mentioned factors are not achieved, it is not possible to gain maximum benefit from joint synergic operations.

Olhager and Selldin (2004, 356) have studied supply chain management in Swedish manufacturing companies. According to them, most often supply chain partners are selected on the basis of their quality performance. Other important selection criteria are delivery dependability and speed, cost efficiency, and volume flexibility. Thus, when selecting partners for collaboration improvement programmes, one should not pay attention only to the motivation and innovation of suppliers but also to technical criteria.

The importance of cross-organisational information exchange and trust between supply chain members cannot be exaggerated (Bowersox et al. 1999, 110). Nevertheless, companies often hesitate in information exchange due to fear of information leaks and loss of competitive advantage. However, when improving the sustainability performance of a transport chain, the question is not about core competencies and therefore cannot violate the firm itself. It would be the best interest of a manufacturing company to share sustainability information with its suppliers and hence, improve the sustainability performance of the whole supply chain. Competitive edge gathered via information exchange would just increase the possibilities of the manufacturing company. But it is not sufficient enough that collaboration participants share information with each other. According to Coyle et al. (2003, 452-453), information needs to be relevant, accurate, and effectively communicated to help participants to get most out of collaboration.

2.1.2 Forms of Collaboration

When buying services from suppliers, a manufacturing company needs to determine the type of logistics relationship it wants to have with them. Coyle et al. (2003, 418-419) have specified a continuum of relationship perspectives (Figure 2-1). According to them, the vendor refers to a supplier that simply sells a product or service but has little or no integration or collaboration with the buyer. The relationship can thus be described as transactional and suits best for one-time purchases or acquisition of standard products or services. The partner refers to a supplier that collaborates with the buyer and the collaboration produces better performance for all participants than what they would achieve by acting individually. The strategic alliance means a relationship where two or more organisations collaborate and adapt their strategies and workings in order to achieve long-term targets. Hence, this relationship is highly strategic and relational. However, Coyle et al. specify that this continuum does not include the firms that own the other collaborative party or have a joint venture with them.

Bask and Juga (2000, 5) suggest in their research that due to supply chain integration difficulties the emphasis is nowadays moving from comprehensive integration towards partially integrated or semi-integrated supply chains. Firms have experienced that comprehensive supply chain integration may cause some disadvantages for them in the long-term partnerships, such as the risk of getting caught into inefficient processes or outmoded technology, as well as the risk of self-righteousness and ossification. These risks are fed by growing competition, technological advancements and ever shortening life cycles (Bask & Juga 2000, 20). However, transport

technology is not elaborated especially fast and its products have long life cycles. Even though the products of a manufacturing company would have short life cycles, they still need to be transported. Hence, it may be more beneficial for a manufacturing company to make collaboration efforts with its transport chain.

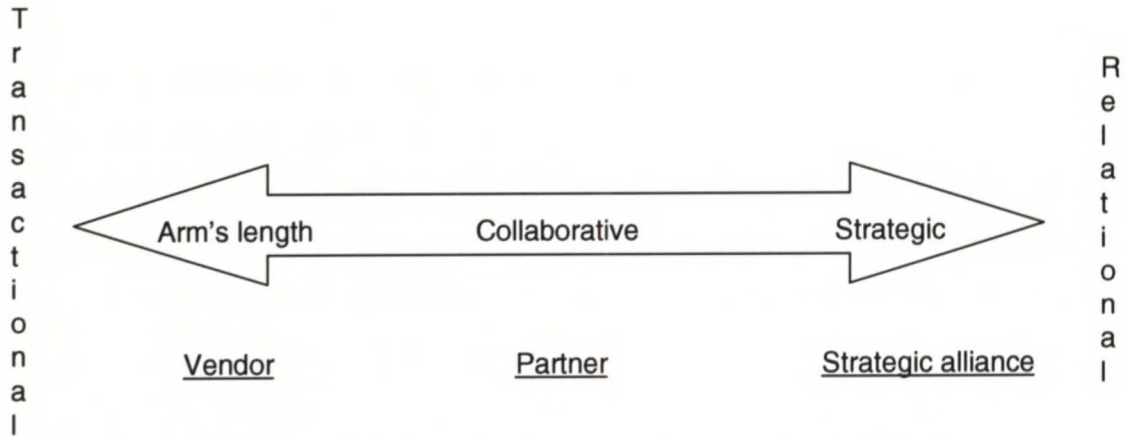

Figure 2-1 Relationship perspectives (Coyle et al. 2003, 419)

According to Bowersox et al. (1999, 70), high index achieving companies often categorise their suppliers into primary and secondary suppliers. This helps them to build strong networks that serve the needs of different major customers and other customer segments. These networks focus on innovation rather than control and use practises that create network excellence instead of traditional internal and external work functions. Bowersox et al. state that the firms that have reached these criteria are industry leaders.

All relationships differ from one another as they depend on the individual participants. Coyle et al. (2003, 419) present that despite of the type of relationship or collaboration, the logistics relationships differ from one another by the degree of duration, obligations, expectations, interaction and communication, co-operation, planning, goals, performance analysis, and benefits and burdens.

When considering how thoroughly a firm should determine contractual terms, one faces a significant problem: whether to determine everything strictly and to loose flexibility possibilities, or whether to determine general principles that should guide the operations. Gibbons (2005, 6) explains the difference between a formal contract and a relational contract as such: "A formal contract must be specified ex ante in terms that can be verified ex post by the third party, whereas a relational contract can be based on outcomes that are observed by only the contracting parties ex post, and also on outcomes that are prohibitively costly to specify ex ante." Thus, a

relational contract allows the parties to utilise their discretion and to adapt new information but needs therefore to be self-enforcing, not forced by a third party. Gibbons (2005, 8) also states that the combination of formal and relational contracts can reduce incentive distortions as well as encourage a buyer to pay bonus for suppliers.

Sometimes it is hard to agree on the supplier's total contribution in the contracts. Gibbons (2005, 4) proposes that in these cases organisations could use either court-enforceable or relational contracts. The court-enforceable contracts are based on alternative performance measures, such as the number of manufactured units with quality and delivery adjustments, whereas the latter types of contracts are self-enforcing contracts that build on total contribution.

In addition to formal and relational contracts, Gibbons (2005, 10-12) represents the third contract type that could be useful in buyer-supplier relationships: paying for future performance. This means that a buyer invests in capabilities and a supplier's value bases on its future value added. A supplier can enhance its future value added for instance by making buyer-specific investments. However, in buyer-specific investments that do not base on contracts is a two-sided incentive problem: the supplier does not want to invest in new resources unless it knows it will get compensation from the buyer, whereas the buyer worries the supplier will not invest unless it can anticipate rewards. This problem can be solved by the promise of promotion. If the buyer promises the supplier to give a promotion, it betweenwhiles links its product assignment decision to the fee that the supplier receives.

2.1.3 Collaboration in Practise

Although a firm may have planned the collaboration and improvement process thoroughly, it may not know how to collaborate with suppliers in practise. According to Bowersox et al. (1999, 108), firms do not always know how to best achieve the desired performance. The question is not that companies would not consider relationship integration important for supply chain success but that they may not be aware of the means, ways or guidelines needed to accomplish the change. Inter-company collaboration needs guidelines to ease leverage and conflict resolution. Further, partners need to be aware of the policy framework that guides their performance. Bowersox et al. state that highly developed guidelines can be recognised if there are plans to establish supply chain relationships and if there is a proper framework to pursue, establish, and monitor relationships as well as terminate outmoded relationships.

To gain the most of the supply chain collaboration, every chain member should know its role in the entity and responsibilities in operations. Bowersox et al. (1999, 65) state that the participants should aim at joint achievement and their targets should be complementary. Bowersox et al. (1999, 106-107) also suggest that supply chain members should jointly define role and responsibility clarifications, identify acceptable collaborative behaviour, and agree on employee empowerment. According to them, when the expectations and tasks are defined, it is easier to manage the performance and diminish the undesired effects on uncoordinated operations.

Simatupang and Sridharan (2002, 20) have examined collaborative supply chains. According to them, the intensity of co-operation varies on the bases of the impact horizon that can be either short-term, medium-term or long-term. This short-term collaboration refers mainly to the aims of supply chain members to confront the usual and unusual needs of products. Medium-term collaboration relates to members' efforts to share responsibilities to synchronise product design or logistics capabilities in order to face competition. Long-term collaboration, yet, involves setting joint targets and policies as well as sharing capabilities to build excellent service competence.

2.1.4 Development of Collaboration

As all relationships, also the relationships between collaborative supply chain members change over time. The study of Kemppainen et al. (2003, 18) shows that firms concentrate first on intra-firm and inter-functional co-ordination. After that, the companies aim at inter-firm co-ordination. Once these are achieved and the basic operations are improved, the companies can seek collaboration within knowledge management.

Simatupang and Sridharan (2002, 19-20), for their part, have defined that supply chain collaboration has a four-phased life cycle that applies to any kind of collaborative relationship. In the first phase, participants engage themselves to collaboration. They clarify the strategic needs of co-operation, find correct partners with correct capabilities and set performance agreements. The second phase includes joint planning of the future. Participants consider future requirements and manage interdependencies on resources, tasks, and capabilities. In the third phase, the process is implemented and participants aim to achieve short- and long-term goals with their daily operations. The problem is, however, how the participants should handle exceptions and how they should estimate the overall performance. Finally, the fourth phase means evaluation of the process. If the performance is not as satisfying as considered, participants can either modify or terminate agreements.

2.2 Developing Supply Chain Operations

In the past, if a supplier had problems with performance, a buyer first tried to pressure it to improvements. However, if the supplier did not succeed in improving the performance, the buyer often just changed it to another. Nowadays it is more common that the buyer attends to improvement process and helps the supplier to increase quality and performance as well as reduce cost (Hartley & Jones 1997, 24).

Hartley and Jones (1997, 24) define supply chain development as "the practise of working with suppliers to improve their performance and increase capabilities." Krause (1997, 12) has ended up with rather similar definition and defines that supplier development is "any effort of a firm to increase performance and/or capabilities to meet the firm's short- and/or long-term supply needs." Krause continues that the significance of these development efforts may vary from simple means, such as supplier evaluation and improvement requests, to demanding means, such as supplier's training and investing in supplier's performance.

To examine supply chain development, we first need to study what stimulates chain members to improvement programmes and who should lead the change. We also need to know why all supply chains do not start improvement programmes if they give a positive impact for the total contribution of a supply chain.

2.2.1 Drivers and Obstacles Affecting Change

When it has been realised that a supply chain has problems with its performance, it may not be that easy to launch development programmes. One member needs to take the initiative and start leading the project. Bagchi and Skjoett-Larsen (2003, 104) have come into conclusion that the drive for supply chain collaboration should come from the member who has the strongest power. Also Simatupang and Sridharan (2002, 27) have ended up emphasising power relationships as they state that the change leader should be the channel champion with market power to influence others' decisions.

According to Bowersox et al. (1999, 135), there exist four change drivers: crisis elimination, waste reduction, value improvement, and external or environmental change. Crisis elimination means that sometimes a company can be in such a tough situation that it has no other means but to make significant improvements to its performance and/or financial structure. A company may want to start development project also due to waste reduction. According to Bowersox et al. (1999, 136-137), value improvement is considered nowadays as the best route to long-term

customer success. External change refers to competitive changes as well as the changes that occur in the market and industry. The development may also start due to environmental changes in resource and technology availability, legal, social, and institutional environment. Finally, Bowersox et al. remind that the development project may originate in one or all change drivers. However, Keebler et al. (1999, 17) have defined five forces of change that drive companies to enhance their supply chains: continuing cost pressure, product commoditisation, growing power of customers, globalisation, and electronic commerce. Logistics is often seen as one of the best targets for cost reductions and best opportunities for improvement. Product commoditisation pushes companies towards stronger product differentiation and customers are demanding more customised service with the help of tightening competition. Moreover, globalisation incurs growing pressures for excellent operations, whereas electronic commerce influences on the customs business partners interact.

As we can notice, the classification of change forces defined by Keebler et al. (1999, 17) differs significantly from the classification of Bowersox et al. (1999, 136-137) which presents more large-scale view of change drivers. Keebler et al. (1999, 17) concentrate purely on the external and environmental changes and therefore their classification does not fit to every industry as the environmental and external changes differ between industries.

But why does not every supply chain initiate development projects even though their processes would need that in order to flourish? Bowersox et al. (1999, 139) have noticed that there are plenty of reasons that prevent companies from collaborative development. According to them, companies may lack real focus on the customer, strategically valuable information, or understanding of supply chain dynamics and economics. They may have difficulties in amending organisational structures and displacing old and accepted, yet inefficient workings. Organisations may also suffer from "not invented here" syndrome or their information may not be organised appropriately for strategic usage. Companies may not have a business case for action and have too little knowledge to executing processes themselves. Finally, the companies that do not initiate development projects may lack senior leadership support or a clear, commonly understood and appropriate strategy and mission.

2.2.2 Development Process

When initiating supply chain development programmes, it is substantially important to plan the project as carefully as possible. Development projects are not inexpensive and thus it is no use for wasting resources if the process will not be executed in earnest. Companies should consider

what kind of improvements they are looking for and then decide which solutions are necessary to reach the targets. As Hartley and Jones (1997, 28) state, the most important, yet most difficult, part of supply chain development processes is to analyse problems and implement changes systems-wide.

It is not possible to gain the most out of development process if the whole organisation is not involved in it. As Bowersox et al. (1999, 140) pronounced: "The change process must have senior management support, functional management endorsement, and buy-in from those who must do the work." If organisation-wide involvement is desired, an organisation needs to choose successful change leaders that will communicate efficiently the benefits and risks of the development process (Bowersox et al. 1999, 144). However, it is not enough that the change leaders just communicate the risks and benefits. If an organisation truly wants to commit its employees and suppliers to change process, these change leaders need to sell the idea for them. If incentives are good enough, suppliers and employees will do their best. In addition, the change leaders may need to sell the idea for the top management if the initiative did not come from them. Development projects cost and must therefore be justifiable.

Sales and purchasing departments of companies have traditionally taken care of buyer-supplier relationships. McDonald et al. (1996, in source Christopher & Jüttner 2000, 121) have clarified the traditional categorisation of "tie and diamond model" in their model. They describe the typical development of an organisation that wants to change its purchasing functions into more collaborative direction. In the bow tie the purchasing department of a buyer negotiates only with the sales department of a seller. Other departments or the strategic level are not involved in the negotiations. These contract deals are central and most important selection criteria are often price and margin. The advantages of the tie model are low switching barriers and the small amount of resources it requires, which enables buying companies to manage large supplier bases. Nevertheless, the low switching barriers can be also seen as a disadvantage as well as the limitation of value creation over the mere product value due to incomplete understanding of each others' business.

In the next step towards the diamond model, the buying company collaborates more with the selling company and also the purchasing and accounting managements involve in this relationship. Boundary spanning employees are getting back-up from further functions and thus this model represents increased commitment to resources. The third phase represents the relationship between companies where direct interactions and collaboration happen between

functions as well as core business processes. This close collaboration requires significantly resources and therefore it is often linked directly to the companies' business strategies. Finally, in the fourth phase the company boundaries become blurred. The collaboration is not only day-to-day operations but the companies truly collaborate with strategic issues such as R & D or market development. This fourth phase is better known as the diamond model. Figure 2-2 presents the interface structures of McDonald's theory.

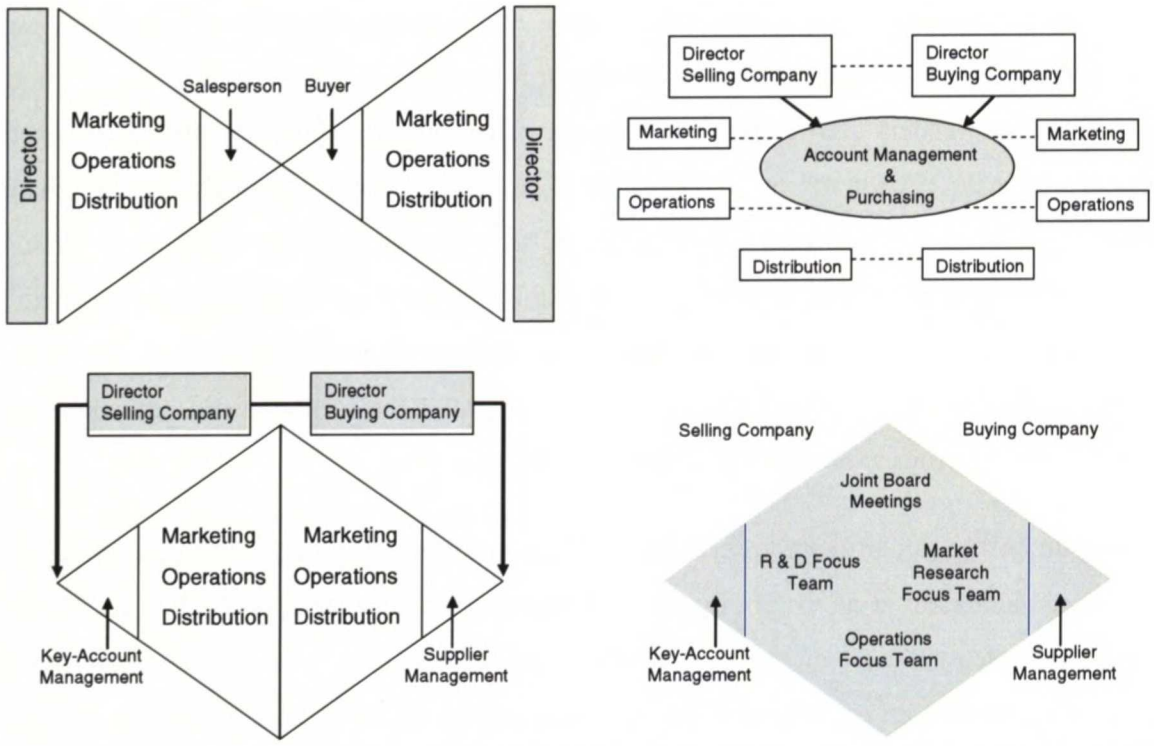

Figure 2-2 Interface structures (McDonald et al. 1996 in source Christopher & Jüttner 2000, 121)

However, the traditional talk about tie and diamond model does not refer to as close merger as the McDonald's model. Usually, the diamond model is seen as a purchasing method where multiple departments attend in contracting process and collaboration but the company barriers may still be quite clear. As Harrison and van Hoek (2005, 234) state in their research, contacts between departments of the other company are encouraged and the arm's length relationship is transformed into vivid relationship management and supplier development processes. The diamond model gives more far-reaching general view of the relationship for the participants and helps them to develop supply chain performance. However, as this relationship model requires more resources from both participants, it is not used with every supplier if the supplier base is large. Due to strong need of resources, the total cost may not be the most inexpensive.

Krause (1999, 208) has specified factors that affect on a buying firm's involvement in supplier development process. According to him, these factors can be categorised on the bases of their conceptual perspective. The most important perspectives are:

1) Environmental and influence factors
2) Barrier factors
3) Attitudinal factor

Environmental and influence factors refer to the buying firm's competition and top management support as well as to the importance of the supplier's input for the buyer. Krause describes that these factors affect on the buying company or its internal purchasing function and thus influence their strategic perspective towards suppliers. Barrier factors refer to the buyer's perception of suppliers' commitment and inter-firm communication effort. Further, attitudinal factor refer to the buying firm's general perspective towards its suppliers. However, it is important to notice that these factors have an impact on each other. Figure 2-3 illustrates these relations.

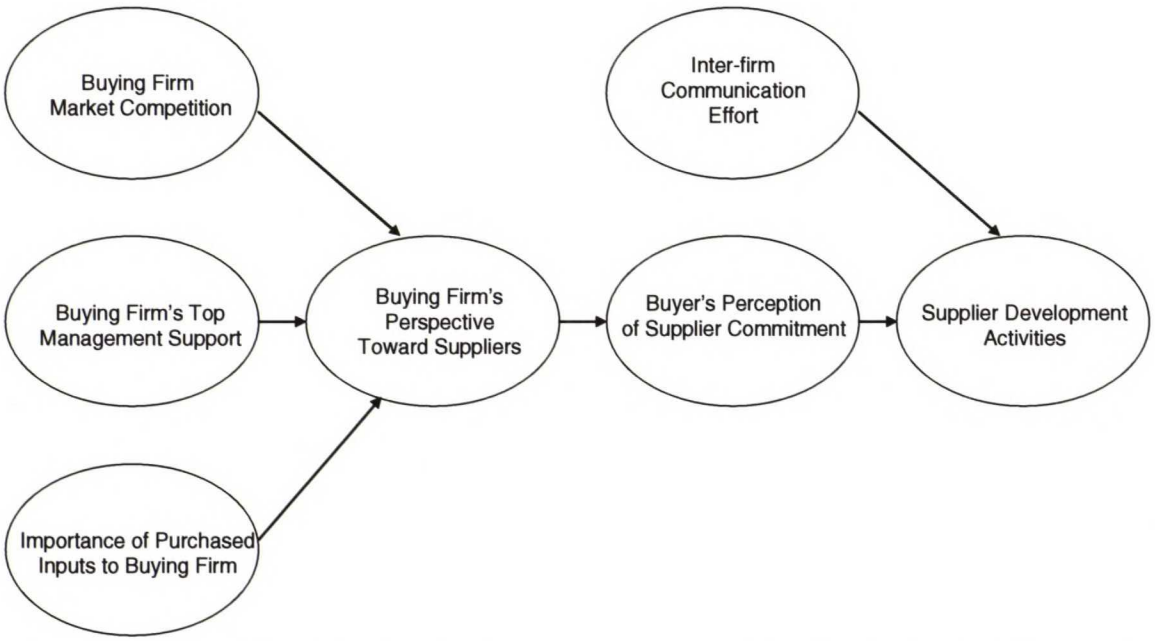

Figure 2-3 Structural model of antecedents to supplier development (Krause 1999, 218)

To succeed in supply chain development process, organisations should estimate their own success during the process. Bowersox et al. (1999, 70) have specified the primary indicators of supplier relationship management. According to them, a good relationship management develops active programmes to positively impact suppliers' suppliers, makes the effort to improve extended supply networks, considers investing in supplier's development, and takes suppliers into decision making process.

Organisations should decide on the exact development model on the basis of the desired targets. If a supply chain requires immediate changes to improve the performance, then it is recommended to start with result-oriented supplier development (Hartley & Jones 1997, 24). If the buyer has time for long-lasting development process and seeks for capability improvements, then it should consider process-oriented development programme.

Figure 2-4 illustrates the difference in supplier development outcomes that occur from results-oriented and process-oriented development programmes. Process-oriented supplier development is designed to increase supplier's own abilities to improve their own performance (Hartley & Jones 1997, 24-25). This means, that although the process lasts longer time, the improvements often continue after the programme ends because the supplier's employees have absorbed the necessary know-how. Process-oriented supplier development programme thus often results in better outcome than results-oriented development. However, Hartley and Jones continue that the development rate may slow as suppliers face more difficult changes.

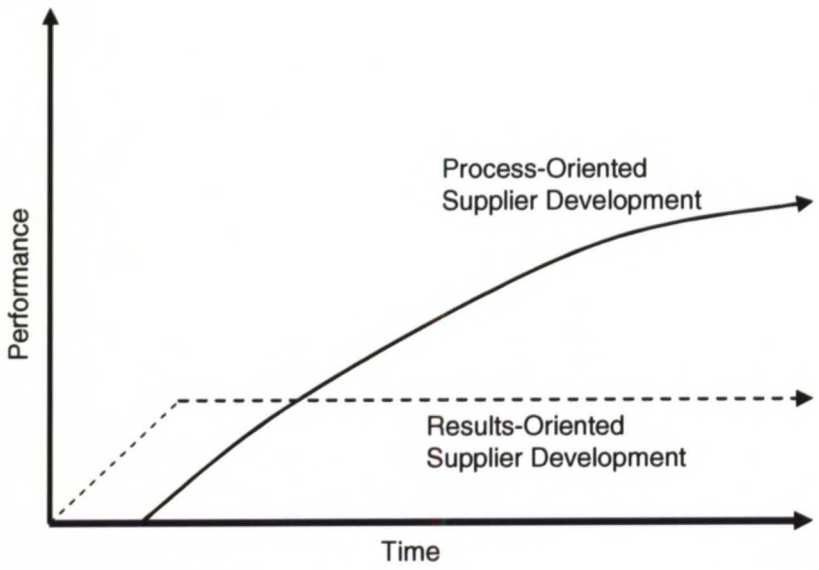

Figure 2-4 Supplier development outcomes (Hartley & Jones 1997, 25)

Hartley and Jones (1997, 24) delineate that results-oriented supplier development has proven to be efficient in short-term change programmes. According to them, many companies have reached significant quality, cost and delivery improvements with the help of these programmes. The programme is fast to execute since it does not require significant design but bases on standard approach (Hartley & Jones 1997, 26). However, problems may rise due to rigid and not supplier-customised process. Moreover, Hartley and Jones remind that even though the process is rapidly executed, the suppliers often return to old habits after the programme finishes because

the supplier's employees do not have enough time to adopt the know-how (Hartley & Jones 1997, 24).

2.2.3 Failures in Development Programmes

Unfortunately supply chain development programmes do not always reach their targets. There may be as many reasons for failures as there are incidents, but there are some common features that can be used as a basis of failure classification. Handfield et al. (2000, 41) have divided the failures of supplier development programmes into three categories: supplier-specific, buyer-specific, and buyer-supplier interface failures. Supplier-specific failures are the most common ones and they are often caused by the lack of suppliers' commitment as well as by the lack of technical or human resources. Also buyer-specific failures are often caused by the lack of commitment if the buying firm cannot see all the potential benefits. To ease development programmes, buying firms should consolidate to fewer suppliers, concentrate on long-term focus, set moderate goals, and prioritise executive commitment to the development programme (Handfield et al. 2000, 44-46). Buyer-supplier interface failures come normally from the lack of mutual trust, poor alignment of organisational cultures, and insufficient supplier incentives (Handfield et al. 2000, 46-48). Bowersox et al. (1999, 65) stated that failures in development efforts often originate in insufficient joint commitment but also in lack of an effective logistics strategy. Simatupang and Sridharan (2002, 15) have noticed that also managerial inertia may cause a supply chain conflict as supply chain members seek their own good instead of the overall supply chain profit.

Bender (1997) has gathered a list of pitfalls that often occur when modelling the supply chain (Coyle et al. 2003, 522). According to him, companies may use a short-term perspective when modelling supply chains even though long-term horizon is a prerequisite for successful change. Details can become a pitfall as companies often either concentrate too much on them or then do not consider them enough. Furthermore, firms may forget geographical dispersions of demand, neglect robustness analysis, or use erroneous analytical techniques when designing supply chain operations. Finally, it is common that companies either ignore cost thinking or use published, inaccurate or incomplete costs, which inevitably results in incorrect calculations.

Lee and Whang (1999, 638) have examined decentralised multi-echelon supply chains. In their research they state that failures in development efforts may result from the number of organisations involved in the process. When numerous companies attend to development process, it is harder to determine performance schemes. Furthermore, it is more difficult to reach

mutual understanding as the programme affects on financial structures of different sites and there are no central governing that would have an ultimate decision power.

2.3 Measuring the Sustainability performance of a Supply Chain

A significant barrier in examining the alternatives on how buyers should estimate the sustainability performance of their suppliers is the lack of relevant literature. The literature concerning the performance measurement of suppliers concentrates more on operational measuring, such as on-time delivery, service level, and reliability. However, when measuring the sustainability performance of a supply chain, one needs to remember that it is not possible to estimate sustainability performance without measuring suppliers' other performance. This is because companies need to focus on the general view of the supply chain and maximise the benefit supply chain gains. Operations should be profitable and a company needs to be able to fulfil the expectations of its customers. Even though a supplier was very sustainability-oriented but it would not be able to deliver goods in time or give keen prices, the buyer may not be able to continue its contract. However, when considering the financial information of suppliers, one needs to remember that it always hails from the past. Hence, when measuring the sustainability performance of a supply chain, one should use performance measurement systems that observe all relevant aspects and also keep watch on the present situation.

Keebler et al. (1999, 64) have noticed in their study that the main obstacles in establishing the logistics measurement system are the support of upper management and access to IT resources and information. Furthermore, companies consider measuring as a difficult task and cannot often connect measures with the corporate strategy (Keebler et al. 1999, 73). Other difficulties may occur due to lack of consensus on used definitions, complexity and misalignment of processes and functions as well as reluctance of people being measured to share information. In general, Keebler et al. (1999, 127) continue that many companies hesitate in creation of new measuring systems because the scope of effort seems so immense. Figure 2-5 represents the implementation approach that Keebler et al. have created to ease the project of developing measuring systems.

Keebler et al. (1999, 127) state that a measuring system should be in line with a corporate strategy. In general, the implementation project should be seen as an experimental work that requires minimal cost and time resources. Keebler et al. delineate that the implementation approach means simply selecting three to five key measures, developing a prototype for collecting, recording and presenting the information, and registering the results. The idea of the approach is to repeat the first five steps over and over again until the iteration has refined the

measuring system. Keebler et al. remind that the initial iteration (steps 1-5) should preferably be performed within four weeks, latest within eight weeks. When continuing iterations, an organisation will receive real measurement data that can be utilised in the final measuring system. The organisation is also able to discover how the information processes really perform and if there is any need for changes or improvements. Finally, Keebler et al. comment that it is not enough to only follow the implementation approach model presented above. All changes require leadership, co-ordinated operation, and changes in behaviour. Thus, it is a necessity that a company agrees on the changes with executive teams, obtains the support of the middle managers, as well as mobilises the model with lower-level employees.

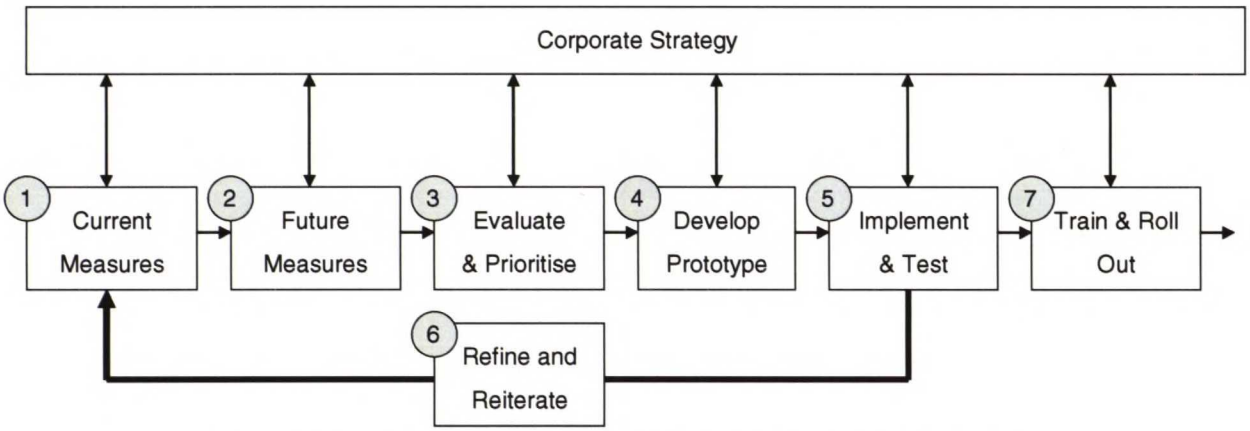

Figure 2-5 Implementation approach (Keebler et al. 1999, 127)

It is of high importance to specify appropriate performance metrics. It is not rare that an organisation has not succeeded in specifying the metrics and realises that instead of desired performance it gets something else. For example, a company may want to start using more sustainable transport suppliers but still rewards its purchasers on the basis of the most low-priced contracts. Gibbons (2005, 5) considers in his study whether a performance measure is good if it correlates highly with a supplier's performance and how this correlation between a performance measure and a supplier's performance should be determined. The problem is that the correlation between the performance and the performance measure may be due to noise terms, such as business-cycle variations. Gibbons states thereby that a performance measure is not valuable as such if it highly correlates with the performance but if it induces valuable actions. As measured performance always differs from the supplier's total contribution, Gibbons recommends that organisations would also use subjective performance assessments in addition to objective metrics.

Keebler et al. (1999, 118-121) have defined 10 characteristics of a good measure (Table 2-1). According to them, a good measure cannot base on feelings or subjective rankings and it needs to be commonly understandable to tell suppliers what exactly is required. A good measure is correctly tuned to enable suppliers to perform prospectively as well as to provide all suppliers an access to view assessment criteria and methods to support the development. A good measure is defined by all collaboration participants and is thus commonly accepted. This is a significant viewpoint as also Bowersox et al. (1999, 88) state that cross-functional and inter-organisational requirements easily create resistance towards performance measurement in supply chains. If a buyer cannot sell the measurement system for its suppliers, it is highly unlikely to benefit from the system.

Table 2-1 Characteristics of good measures (Keebler et al. 1999, 8)

A Good Measure	Description
- Is quantitative	- The measure can be expressed as an objective value.
- Is easy to understand	- The measure conveys at a glance what it is measuring, and how it is derived.
- Encourages appropriate behaviour	- The measure is balanced to reward productive behaviour and discourage "game playing".
- Is visible	- The effects of the measure are readily apparent to all involved in the process being measured.
- Is defined and mutually understood	- The measure has been defined by and/or agreed to by all key process participants (internally and externally).
- Encompasses both outputs and inputs	- The measure integrates factors from all aspects of the process measured.
- Measures only what is important	- The measure focuses on a key performance indicator that is of real value to managing the process.
- Is multidimensional	- The measure is properly balanced between utilisation, productivity, and performance, and shows the trade-offs.
- Uses economies of effort	- The benefits of the measure outweigh the costs of collection and analysis.
- Facilitates trust	- The measure validates the participation among the various parties.

Keebler et al. (1999, 118-121) continue that a good measure needs to cover the process comprehensively to pinpoint the real reasons for problems and thus enable the best development. Besides, the number of measures used should be limited so an organisation needs to consider thoroughly what it really wants to measure. The costs of data collection and analysis must not exceed the benefits that the measuring produces and therefore a good measure needs to be economically collectible. Finally, suppliers need to be able to trust the measure. This means that the accuracy of the measure and information collection must be transparent for all suppliers.

2.3.1 Comprehensive Measurement

When measuring the performance of a supplier or a supply chain, one needs to observe many aspects of company's performance. Bowersox et al. (1999, 118) have defined the most important aspects that affect on the performance of a supply chain as customer service, cost management, quality, productivity, and asset management. Figure 2-6 illustrates this comprehensive supply chain management model.

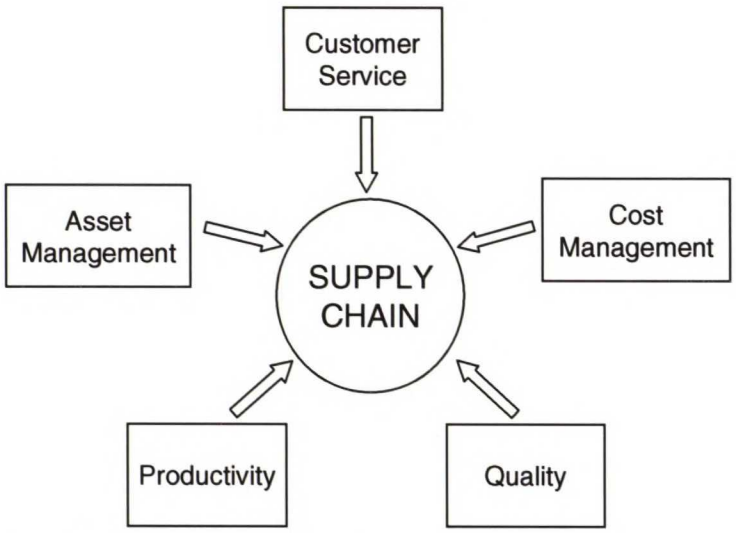

Figure 2-6 Comprehensive supply chain measurement model (Bowersox et al. 1999, 118)

Bowersox et al. (1999, 118) have also defined some typical metrics that could be used when assessing comprehensive supply chain performance:

- Customer service: customer satisfaction, product flexibility, delivery speed
- Cost management: logistics cost
- Quality: delivery dependability, responsiveness, order flexibility, delivery flexibility
- Productivity: information systems support, order fill capacity, advanced shipment notification
- Asset management: inventory turn, return on assets

When measuring the sustainability performance of a supply chain, one should add a sustainability aspect to this model. This aspect could either be included in quality aspect or respectively added to the model as a distinct metrics group.

2.3.2 Balanced Scorecard

The balanced scorecard method of Robert Kaplan and David Norton is developed for linking financial and non-financial aspects together fast but comprehensively (Drury 2000, 929). Its aim

is to give companies a framework for translating a corporate strategy into a coherent set of performance measures.

There are four perspectives that can be assessed with the help of balanced scorecard: financial, customer, internal business processes, and learning and growth (Figure 2-7). Balanced scorecard thus combines learning and growth perspective to traditional perspectives. This is essentially important when assessing the performance improvements of a supply chain. But one needs to remember that it is also possible to include learning and growth perspective to the comprehensive measurement model of Bowersox et al. by controlling learning in context with other aspects.

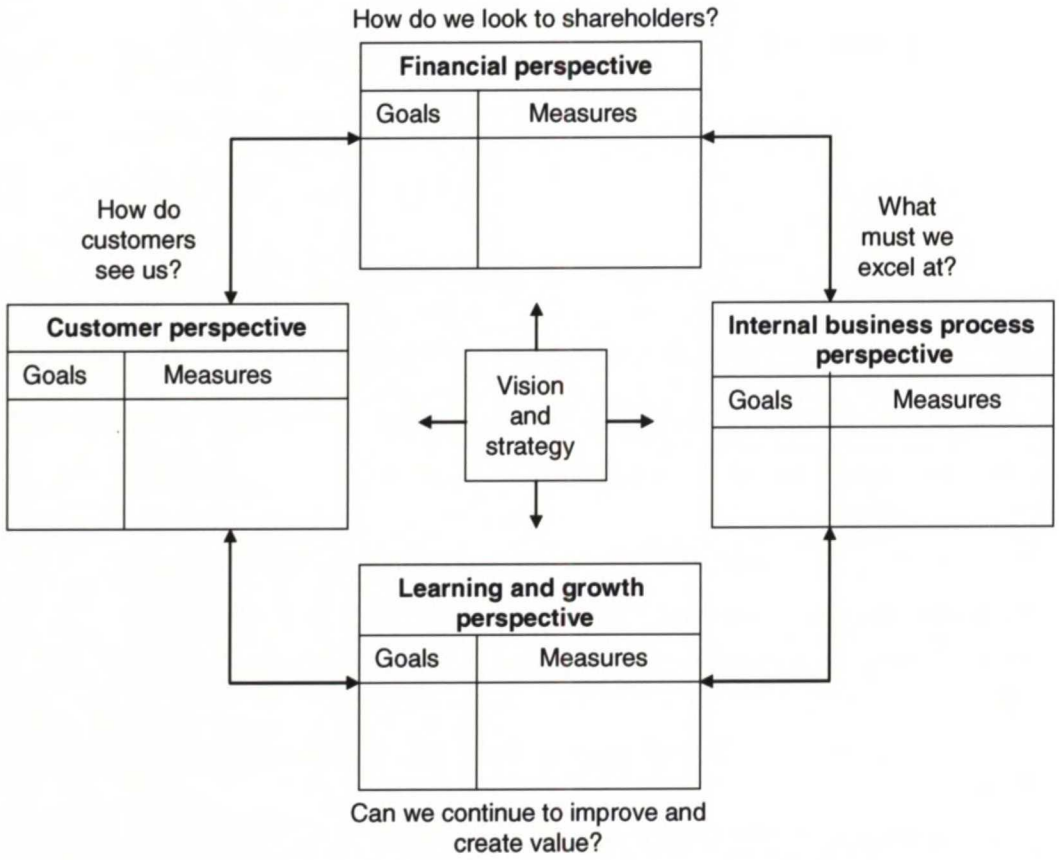

Figure 2-7 Balanced scorecard (Kaplan & Norton 1996 in source Drury 2000, 930)

Kaplan and Norton present that to avoid the overload of information, companies should first define the most important targets of each perspective and then translate them into appropriate performance measures (Drury 2000, 929). However, the amount of the measures in each box should stay between three and five. Kaplan and Norton suggest that in the customer perspective box companies should review the aspects affecting on market share, customer retention and loyalty, customer acquisition, customer satisfaction, and customer profitability (Drury 2000,

932-939). When considering the internal business perspective, companies should assess innovation, operation, and post-service sales processes. Finally, in the learning and growth perspective box companies could dissect employee and information system capabilities as well as motivation, empowerment, and alignment.

Kaplan and Norton remind that the best way to stay in touch with a corporate strategy is to frequently update the criteria in the balanced scorecard (Drury 2000, 929). Critical performance measures change over time as a result of strategy focus. When examining the implementation process of the balanced scorecard, Kaplan and Norton realised that most of the companies did not tie the measures with the strategy but tried to improve their prevailing operations without identifying the truly important strategies for the corporate success.

2.3.3 Benchmarking

Performance metrics are useless unless they can be compared to some standards. Bowersox et al. (1999, 93) realised in their study that most firms compare their performance either to their performance during the previous year or to the performance of their competitors. Benchmarking refers to the process of identifying and learning from the best practises of other organisations. It is indeed an efficient and rather common way to compare the performance of a supply chain with its competitors. Benchmarking is used especially to find out efficiencies and to learn more about value creation (Karlöf 2002, 98). However, it is very critical to choose a correct comparison to benefit from benchmarking (Bowersox et al. 1999, 96). Although the outcome of an organisation may seem profitable, the organisation can have problems in separate fields (Karlöf 2002, 96). Moreover, companies often overlook the differences between companies that leads to technocratic approach and converse result.

Benchmarking can be conducted in three levels: the best internal method, the best external method, or the best functional method (Karlöf 2002, 97-98). The best internal method refers to the internal functions that resemble one another and external method refers to resembling functions inside the industry. Finally, the best functional method means that a company compares its functions with the similar functions of other industries in order to find excellence. The company should select the method on the basis of the situation and the location of excellence.

2.3.4 Supply Chain Operations Reference Model (SCOR)

Supply Chain Council (2005) has developed a cross functional model from the concepts of business process reengineering, benchmarking, and process measurement by integrating the strengths of each concept (Figure 2-8).

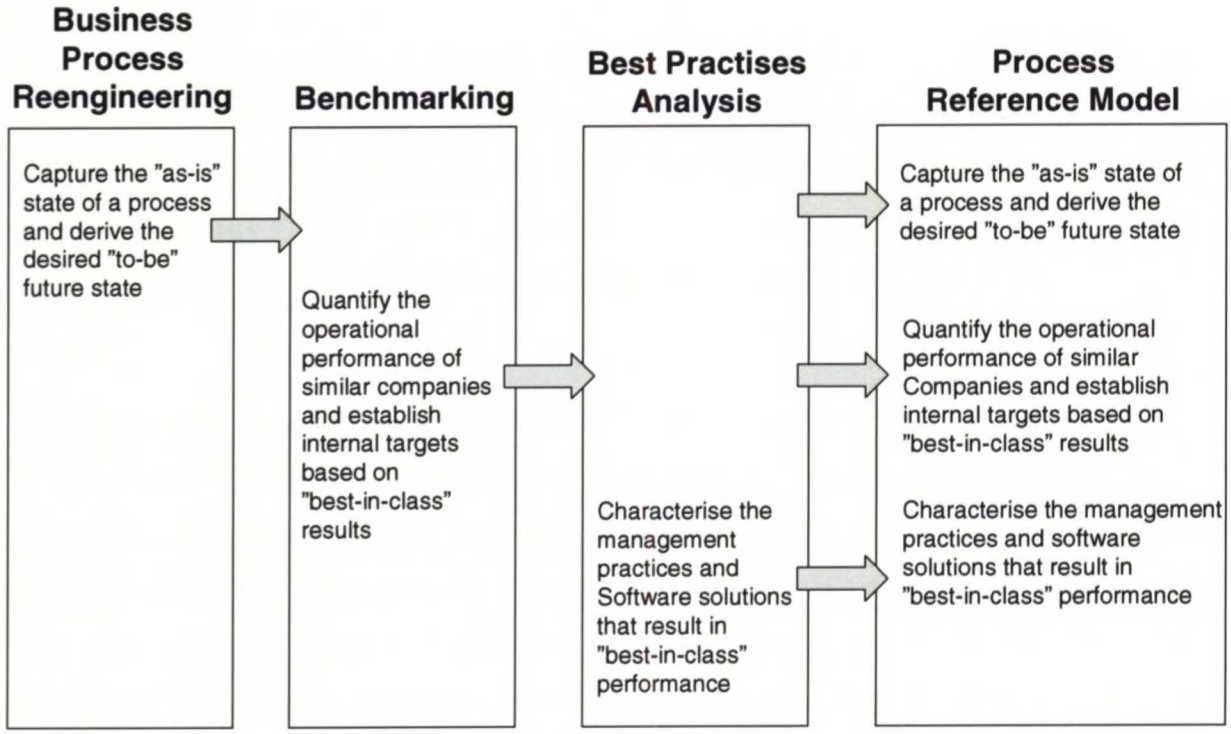

Figure 2-8 Process reference model (Supply Chain Council, 2005)

The model is used for describing, measuring and evaluating the supply chain complexes (Supply Chain Council 2005). It is based on five distinctive management processes: plan, source, make, deliver, and return. This means that an organisation needs to plan its demand and supply in long term perspective considering among others long-term capacity and resource planning, weighing the aspects concerning material and service sourcing, taking care of the normal operations, managing orders, warehouses, and transport in day-to-day level, as well as taking care of possible returns. These management processes are seen as combining the corresponding processes of the participants and the reference model monitors them all comprehensively.

Supply Chain Council has also developed the SCOR model to green logistics. GreenSCOR observes environmental processes, metrics and best practises and could thus be useful tool for organisations that want to develop the sustainability of their operations. However, these performance measurement models cannot be used or examined thoroughly unless the organisation is a member of Supply Chain Council.

2.4 Commitment to Collaboration

As discussed earlier, an essential prerequisite for successful supply chain collaboration is chain members' high level of commitment to the relationship (Simatupang & Sridharan 2002, 25). Anderson and Weitz (1992, 19) define commitment to a relationship as "a desire to develop a stable relationship, a willingness to make short-term sacrifices to maintain the relationship, and a confidence in the stability of the relationship". According to them, the commitment asymmetries result in unsatisfactory relationships. This is because the less committed party may behave opportunistically towards the more committed and thus more vulnerable party (Anderson & Weitz 1992, 20). Further, the less committed party is more prepared to give up the relationship and does not necessarily value the sacrifices the more committed party has made.

Referring to the paragraph above, it is no wonder that many studies have found out that the collaboration commitment of supply chain members depends on their perceptions on other member's commitment (Anderson & Weitz 1992, 18; Krause 1999, 219; Prahinski & Benton 2004, 57). Anderson and Weitz (1992, 28) noticed in their research that suppliers were more committed to the manufactures that were the most committed to collaboration and the manufacturers were likewise. The study of Prahinski and Benton (2004, 56-57) showed that the supply chain members seek evidence of the buyer's commitment from the buyer's workings. The suppliers appreciate communication formality and the buyer's ambitions to improve open dialogue in the buyer's supplier assessment process. Furthermore, collaborative communication and the buyer's willingness to co-operate in problem solving are believed to enhance the buyer-supplier relationship. Prahinski and Benton interestingly concluded that the suppliers they studied did not consider that the buyer-supplier relationship would directly influence on suppliers' performance. However, this result could be argued with the following: if a buyer-supplier relationship is unsatisfying, the supplier does all it is obliged to do but does not stretch and make extra efforts. In other words, the supplier does nothing less but nothing more. Yet, if the supplier is satisfied with the relationship, it may stretch and do all the possible arrangements to help the buyer. Hence, it could be argued that at least to some extent the buyer-supplier relationship does affect the supplier's performance.

But as noticed earlier, participants' commitment to collaboration process is not axiomatic. Anderson and Weitz have defined that in addition to participants' assumptions of other participants' commitment, there are other significant factors affecting on commitment in channel relationships: self-perceived pledges, communication level, reputation, and relationship history.

Although incentives would be tempting, the supplier does not necessarily want to engage in collaboration with the buyer that has mistreated it before.

2.4.1 Buyer's Commitment to Collaboration

Although a buying firm is often the initiator of supply chain collaboration efforts, it is not axiomatic that its own organisation is fully committed to change process. Krause (1997, 14-16) has used factor analysis to study buying firm's commitment to supply chain improvement efforts. According to him, there are three basic ways of acting when a buyer wants to enhance the supply chain performance: it can force suppliers to severe competition, offer incentives for performance improvements or involve itself to supplier's operations.

If the buyer uses enforced competition as an improvement motive for suppliers, it does not commit itself to collaboration as it does not involve in efforts as such. The buyer may get significant profitability increases when focusing on price but performance lapses may happen somewhere else. An old phrase "you get what you measure" still applies. However, this is not a surprising result when considering the fact mentioned earlier: suppliers commit best to manufacturers that are most committed to them.

Due to the disadvantages of enforced competition it may be wiser for a company to offer its suppliers Krause's no-lose proposition: performance improvement incentives. Here the buyer offers the suppliers higher volumes or future business if the supplier can increase its performance as desired.

Krause's third option, direct involvement, may be expensive and laborious but has the best opportunity to succeed due to the buyer's commitment to collaboration. Direct involvement means that the buyer makes time and resource investments in the suppliers, for example visits supplier's sites, trains supplier's employees, and attends to supplier certification programmes (Krause 1997, 15). The basic requirement for the success of direct involvement is communication and interaction between the buyer and the supplier.

Finally, Krause presents that it is possible for the buyer to use an integrated alternative of these approaches. For instance, a company could use promises of future business as incentives and sometimes challenge suppliers into competition. However, long-term benefits would be gained with the help of direct involvements. Buyers could respectively exploit a Japanese approach that is a kind of mixture of the above mentioned approaches (Krause 1997, 15). The buyer sources each input from a small number of suppliers to ensure competitiveness. Well performing

suppliers are rewarded with higher volumes whereas the volumes of low performing suppliers are reduced until they have developed their activities. The buyer does not leave the low performers alone but offers them help to increase the performance. According to Krause, the purpose of the Japanese approach is not to get the lowest possible price but to ensure quality and delivery reliability.

2.4.2 Means for Committing Suppliers

As discussed earlier, the commitment to change is one of the major factors for collaboration success. Suppliers are looking for commitment signs, such as management involvement and resource investments, from buyers' behaviour. But are there some concrete means that buyers could use when committing their suppliers to collaboration?

Many studies point out the significance of suppliers' broad-based participation in strategic planning and decision making as a way of increasing commitment (Bowersox et al. 1999, 70; Hartley & Jones 1997, 28). As suppliers have an opportunity to involve in the change process, they will increase their know-how and improve performance capabilities. According to Hartley and Jones (1997, 28), suppliers' employees are more willing to collaborate as their change resistance reduces in consequence of participation. However, Prahinski and Benton (2004, 60) have noticed that suppliers will properly commit to change process only when they expect that the relationship will continue for many years.

When trying to commit suppliers to change process, buyers should remember that suppliers need individual benefits to be motivated towards the process. As Simatupang and Sridharan (2001, 19) stated "collaboration is a self-interested process in which firms will participate only if it contributes to their own survival". Bowersox et al. (1999, 112) have indeed noticed that partners are more motivated to reach improvements if the gains are shared or mutually reinvested. To ensure that the reward programme offers every supplier an incentive to develop operations, Simatupang and Sridharan (2002, 22) suggest buying firms to launch special incentive menu. Thus, the buyer could offer a sufficient number of tailored incentives that suppliers truly value. But the buyer needs to remember an important matter: the incentive loses its motivation potential if the delay between performance improvements and time of reward is too long (Simatupang & Sridharan 2002, 22).

Simatupang and Sridharan (2002, 26) have defined three main types of incentive alignments that could be used as a basis on supplier motivation: productive behaviour, behaviour-based

incentive, and equitable compensation. Productive behaviour means that buyers could reward suppliers on the basis of development steps rather than on the basis of end result. Behaviour-based incentive suits best for incentive menu usage. A buyer assesses suppliers on the basis of performance metrics and rewards them for improvements in the most important operations. Or if these two options do not fit to the buyer's organisation, it can also give the same compensation for every successful supplier. According to the study of Handfield et al. (2000, 41-44), other supporting means for committing suppliers have been open reporting about suppliers' performance in relation to other suppliers, keeping change requirements simple, and offering personnel support. This is also supported by the fact that the supplier's top management does not consider development programmes profitable if the buyer does not commit sufficient resources for them (Handfield et al. 2000, 48).

Krause et al. (2000, 49-50) suggest that the key enablers of supplier development are supplier assessment and supplier incentives. Supplier assessment is seen as a means for estimating suppliers' performance and comparing it with their competitors. Assessment also gives suppliers a direction to drive improvements. Supplier incentives motivate suppliers to improve performance by giving promises of future business. However, Krause et al. noticed that supplier incentives and assessment may influence on suppliers performance only indirectly, and the main change enabler would be direct involvement, like supplier training, when a buying firm wants to gain significant improvements. Managers should therefore also be prepared for direct involvements if it seems that the improvement process is too stumbled. Nevertheless, the study of Krause et al. studied primarily the relationships between manufacturing firms and their raw material or component suppliers (Krause et al. 2000, 40). Thus, it could be possible that the last-mentioned result differed when examining transport chains. If a supplier has difficulties in its production process, a buying manufacturing company can offer the supplier some help of its own engineers. However, it can be argued that transport is typically not a core competence of a manufacturing company. There naturally exist manufacturing companies that do consider transport as their core competence, for example dairy producers, but these are a clear minority in the manufacturing field. Hence, the manufacturing company should consider thoroughly whether it has enough knowledge to interfere the actual operations of transport suppliers. In addition, if a manufacturing company outsources its transport services, it may not have enough information to take care of these functions afterwards. Apart from this dissenting viewpoint, there exist studies that differ with the results of Krause et al. study. For example, Prahinski and Benton (2004, 56) found out in their study that the suppliers did not consider that the buying firm's attempts to

enhance suppliers' performance with education and training directly improved their performance. The suppliers thought that the enhancement gathered was mainly based on the fact that the buyers showed they were committed and co-operative to the project, which eased the suppliers to make efforts.

In her supplier satisfaction dimensions categorisation Maunu (2003, 95) summarises efficiently the factors affecting suppliers' satisfaction. Maunu presents that these factors can be categorised into two groups: business related and communication related dimensions (Table 2-2).

Table 2-2 Supplier satisfaction dimensions (Maunu 2003, 95)

Business Related Dimensions	Communication Related Dimensions
Profitability	Roles & Responsibilities
Agreements	Openness & Trust
Early Supplier Involvement	Feedback
Business Continuity	'The Company' Values
Forecasting/Planning	

Business related dimensions refer to hard and fact based values such as profitability and agreements that are the key issues in business (Maunu 2003, 95). Both collaboration participants need to have profitable operations and agreements must cover all the operation aspects. Pricing and payment terms need to be fair plus participants need to respect joint rules and policies. Besides, suppliers would like to collaborate with a buyer straight from the beginning of the projects. Business continuity and forecasting can be seen as risk management; the buyer shares both its short-term and long-term forecasts to ease the resource allocation of the supplier. Long-term forecasts, yet, relate to business continuity as the suppliers need to have some knowledge of relationship continuity in order to make important investments (Maunu 2003, 96).

The communication related supplier satisfaction dimensions defined by Maunu (2003, 96) refer to softer and more human related values. According to Maunu, communication defines how comfortable it is to collaborate with the buyer whereas roles and responsibilities clarify the persons and organisations that supplier should work with. Openness and trust are very personal and subjective questions but they do affect on suppliers' satisfaction. Also feedback is important for suppliers. Often suppliers ask buyers to give both qualitative and quantitative feedback of their success. Finally, the company value affects significantly the buyer-supplier relationship. If the supplier has the same values than the buyer, it may find it easier to collaborate. Thus, communicating company values also eases the target accomplishment.

2.4.3 Problems in Incentive Programmes

Problems in incentive programmes may result from incentive misalignment or distorted reward programmes. Simatupang and Sridharan (2002, 18) have noticed that for some supply chain members it is possible to opportunistically abuse trade deals at the expense of other members. As one member concentrates on local rewards and penalties, the overall supply chain profitability suffers at the expense of other participants.

Distorted incentive programme means that the incentives an organisation offers to its suppliers or employees do not lead to desired behaviour. According to Kerr (1975, 779-780), there exist two main causes why distorted reward programmes are so prevalent: "fascination with an objective criteria and overemphasis of highly visible behaviours." This means that organisations would like to use simple, quantifiable standards or easily measurable behaviour to assess and reward performance instead of subjective and intricate measures. To illustrate the problem of distorted reward programmes, Kerr gave an example of a company that rewarded its typists on the basis of written letters. The reward programme needed to be adjusted when the organisation management noticed that the typists spent their lunch hours tapping one button of a typewriter.

Totally different perspective for incentive pitfalls is presented in the model of Christopher and Jüttner (2000, 120). They describe the suppliers' "career path" that is rather widely adapted in the supplier categorisation. Figure 2-9 illustrates this categorisation.

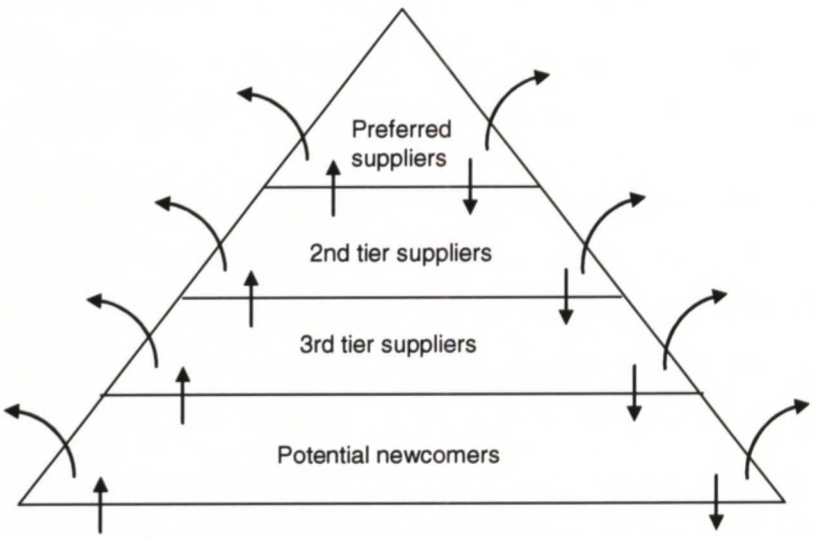

Figure 2-9 Supplier hierarchy (Christopher & Jüttner 2000, 120)

The purpose of the supplier hierarchy is often to encourage suppliers to commit the companies located in the higher levels to collaboration (Christopher & Jüttner 2000, 120). In the hierarchy all potential new suppliers will enter the system at the bottom from where they can ascend

through frequent supplier evaluations. But also higher level suppliers may be downgraded if their performance is not satisfying enough. And if a supplier's performance does not meet the performance standards of a buying company, it may have to exit from any level. The buyer often allocates more business and resources for the suppliers in the higher levels and thus encourages them to reach higher in the hierarchy. However, Christopher and Jüttner claim that often the commitment of the top tiers is not higher than the commitment of rock-bottom suppliers. To be precise; the first and second tier suppliers are even lower committed to the collaboration. This may be due to the complacency of the top tier companies, unfair rating system or the tiredness of the top tier companies. As suppliers are forced to hard competition of the high level positions, they may sacrifice lots of resources to achieve their targets. However, as the companies have earlier sacrificed that much, they may not be willing to continue investments. As a summary, Christopher and Jüttner state that it is indeed necessary to evaluate relationships and these classifications are often supportive – however, it is of great importance to use official partner classifications carefully and review these regularly.

2.5 Sustainable Management

Previous subsections have examined general fields of supply chain management. Now it is time to study what special features sustainability brings to this subject. First, we will discuss the launching motivations of sustainability processes. Second, companies' sustainability strategies are examined. Third, we will take a look at the possible implementation problems of sustainability projects.

2.5.1 Drivers for Sustainability Improvements

What encourages firms to launch sustainability improvements although they are not usually required by the law? Young and Kielkiewicz-Young (2001, 261) have examined sustainability management in supply networks. According to them, an essential part of sustainable supply network management (SSNM) is managing corporate risk. SSNM can also lead to competitive edge as it can be a strategic and opportunity-driven method. To utilise the advantages of SSNM, a buyer should not use purchasing power to force suppliers implement its demands but to trust suppliers, communicate openly, and work with the network. Young and Kielkiewicz-Young state that whether a buyer gains competitive edge really depends on its ability to leverage sustainability advantages in the supply chain. Maignan et al. (2002, 646-647) specify that these business benefits could be, for instance, no-negative publicity, possibilities to new innovations, good marketing to customers, and greater employee commitment towards the organisation.

Roberts (2003, 168) has investigated the implementation of ethical sourcing codes of conduct in different industries. According to her, there are four main factors that persuade different supply chain networks to launch an ethical sourcing code of conduct: length and diffusion of a supply chain, reputation vulnerability of supply chain members, and power of chain members. If a supply chain is very long or diffused, it is hard to manage the change process, measure performance, find appropriate incentives and offer support. However, if the reputation of chain members is vulnerable, the participants may be very willing to urgently launch change process. Power of chain members may either increase or decrease willingness to change process depending on power relations between chain members and viewpoint of powerful members. Maignan et al. (2002, 644), for their part, specify that there are three main factors that drive companies to use proactive sustainability strategies: stakeholder pressures, organisational values, and concrete business benefits.

Carter and Jennings (2004, 168-169) have studied the possibilities for purchasing social responsibility. In their research they noticed that the most important drivers for making socially responsible purchases were: organisational culture and top management leadership, employee initiatives, and customer demands. Especially top management and corporate leaders are in a key position when influencing organisation values. Further, top management influences remarkably the purchasing managers' attitudes towards socially responsible purchases and thus has an impact on how thoroughly the new programmes are implemented (Carter & Jennings 2004, 168). This is supported by the study of Maignan et al. (2002, 641), which revealed the fact that a large number of purchasing managers do not know how they should include socially responsible aspects into purchasing decisions and what concrete management means socially responsible buying requires. Hence, there is a significant need for top management support and common corporate policies of socially responsible purchasing. To successfully implement the sustainable sourcing codes of conduct, a manufacturing company also needs to prepare its procurement function with an adequate capacity. It needs to be able to manage environmental and social issues in the supply network, as well as handle effective relationships with different supply chain members and other external organisations (Roberts 2003, 169).

Björklund (2005, 237-257) suggests in her research that there are several factors that typically increase suppliers' environmental ambition. To motivate suppliers to enhance their environmental performance, a manufacturing company should give external guidance and support, inform thoroughly on the criteria used when assessing suppliers, concentrate on the most important aspects, and gather information of suppliers' environmental status via personal

contacts and questionnaires. A manufacturing company should also inform suppliers about its environmental goals, ambitions and other relevant factors in longer time perspective, apply competitive bids regarding the environmental aspect, consider the environmental aspect separately from the other aspects and give priorities to sustainability when selecting suppliers, make sure the environmental demands are fulfilled, and finally, insert the environmental status criteria in the written contract.

2.5.2 Sustainability Strategies

To succeed in sustainability improvement programmes, companies should consider thoroughly the strategies that suit best for their business environment and supply chain. To help this decision, Young and Kielkiewicz-Young (2001, 264-265) have combined the most common tools and strategies in sustainable supply network management (SSNM). Table 2-3 depicts the list of sustainability strategies.

Table 2-3 Sustainability strategies (modified from Young & Kielkiewicz-Young 2001, 264-265)

Strategies that aim to enhance collaboration between participants:
1) Communicating to suppliers about sustainability policies and values
2) Building closer relationships with suppliers and familiarising them with the company's policy, goals and future intentions
3) Training suppliers for sustainability matters
4) Developing special sustainability programmes with suppliers that meet set objectives
5) Developing priorities together with suppliers to improve performance (and giving each other access to account books)
Strategies that aim to intensify the operations of an organisation:
6) Conducting sustainable assessment of suppliers (company visits, third party audits or suppliers' periodical self-assessment)
7) Training organisation's internal personnel (especially purchasers) for sustainability issues in purchasing
8) Forming environmental, purchasing, and sales personnel into cross-functional sustainability teams
9) Working with the same sector organisations to develop sustainability programme methods for supply chains
Strategies that create a basis for collaboration:
10) Setting pre-qualification criteria that suppliers need to fulfil to be considered as a preferred supplier (most common requirement for an environmental management system)
11) Setting special sustainability specifications for tenders
12) Obliging suppliers to reach certain sustainability level during the contract period
13) Finding financial incentives both for a buyer firm and suppliers to improve sustainability performance

The sustainability strategies have been classified into three groups on the basis of their purpose: The strategies that aim to enhance collaboration between the participants of the sustainability improvement process, the strategies that aim to intensify the internal operations of an organisation, and the strategies that create a basis for collaboration by formalising the processes and insuring the financial potential for sustainability performance. It can be assumed that in order to succeed in sustainability improvements of transport chains, one should implement strategies from every group.

According to Young and Kielkiewicz-Young (2001, 264-265), the simplest strategy of SSNM is leveraging the policies and goals of a company. Also so called supplier impact managing tools, like pre-qualifying suppliers, tender specifications and contract obligations, are widely used. Supplier training, observing and assessment tools are used to back up the previous methods. The most opportunity-driven and advanced strategies may utilise all strategies in the above-mentioned list.

Although supplier audits are still the most reliable way of improving the sustainability in transport chains, they are not usually conducted straight in the beginning of sustainability development programmes. Haltsonen (2004b, 125) has defined corporate social responsibility (CSR) levels that companies could follow when developing CSR in their supply chains (Figure 2-10).

The first CSR level forms the basis of the improvement programmes. Companies define their sustainability codes of conduct and reflect operation decisions with it. The second and third CSR levels aim to improve ethical principles but they do not often reach their targets as there is no efficient monitoring system (Haltsonen 2004b, 127).

It is especially difficult to monitor supplier's social responsibility performance. For example, in Finland Kesko is the only retail chain that has succeeded in creating the monitoring system of suppliers' sustainability performance (Haltsonen 2004b, 127). Kesko launched the SA 8000 – standard of working conditions already in 1999. However, despite the hard work only 18 Kesko's foreign suppliers had achieved this certificate by the end of the year 2003. This example shows us efficiently how massive and complicated problem we are dealing with.

In her study of environmentally preferable transport services purchases Björklund (2005, 85) presents that the most far-reaching approach in developing environmental performance of a company is the value-seeking strategy. This means that a company consolidates its

environmental activities into its business strategy and operates to reduce environmental impacts as a strategic initiative. Also Handfield et al. (2000, 38) state that when developing supply chain performance, procurement and supply chain management should be seen as a source of competitive advantage. Hence, the supply chain management strategy should be aligned with the business strategy to guarantee successful results.

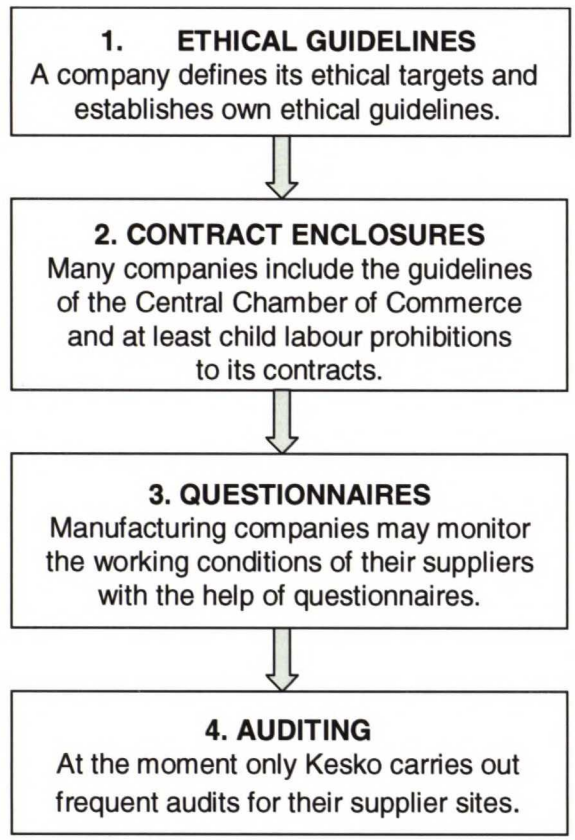

Figure 2-10 Corporate Social Responsibility levels (Haltsonen 2004b, 125)

Table 2-4 presents the socially responsible buying strategies specified by Maignan et al. (2002, 643). Major motivators for these strategies are often different stakeholder demands. The strategy continuum moves from reactive strategies to proactive strategies. Maignan et al. remind that often the purchasing strategy evolves as companies face increasing stakeholder pressures. However, the strategies may not be similar to every stakeholder pressure. This naturally depends on the value-focuses of the firm, for example a company may value more environmental factors and thus have proactive environmental strategy but it can also care less about social responsibilities and have reactive strategy in these matters.

Table 2-4 Socially-responsible buying strategies (Maignan et al. 2002, 643)

Reactive Strategies	Defensive	Accomodative	Proactive Strategies
Denying the relevance of any stakeholder issue to the organisation; denying that the firm has stakeholder responsibilities.	Implicitly acknowledging the existence of stakeholder issues, but avoiding to address these issues.	Addressing stakeholder issues as long as they do not impair established organisational processes and financial performance.	Systematically anticipating, surveying, and addressing stakeholder demands.

If a company chooses to implement proactive socially responsible purchasing strategies, it usually wants to pay attention to its stakeholders' demands. Maignan et al. (2002, 643-644) recommend that to successfully implement proactive strategy, companies should define social responsibility targets for their purchasing functions, appoint persons in charge of social responsibility, educate, monitor, and sanction suppliers, communicate achievements to stakeholders, as well as ask stakeholders to give feedback.

2.5.3 Implementation Problems

In the earlier sections we have discussed sustainability improvement strategies and drivers. It is important to realise that these projects require a significant amount of resources. Maignan et al. (2002, 644) remind that socially responsible buying activities necessitate remarkable investments in supplier selection, monitoring, labelling, and training. Often it may happen that buyers need to make business with more expensive suppliers in order to execute improvement processes. Moreover, some companies feel that they become more vulnerable to stakeholders' additional demands if they launch sustainability processes (Maignan et al. 2002, 645). Thus the company may want to settle for more reactive strategies. However, if the company decides to launch sustainability improvement processes there might emerge some implementation problems.

The most common problems in implementing SSNM are rather similar to those in conventional supply network management (Young & Kielkiewicz-Young 2001, 266-267). These include management style, imperfect communication, corporate culture, lack of knowledge, lack of trust, and lack of top management commitment. "Silo mentality" and department empires can impede an organisation from executing cross-functional methods to attain the most out of sustainability programmes. Other implementation obstacles can be the lack of necessary resources as identifying, collecting, analysing, and verifying sustainability information may require large amount of money and management time. Added to this, a significant problem is the lack of reliable sustainability information. It may be hard for an organisation to estimate the truthfulness

of the information its suppliers offer about their suppliers and products. Finally, a common obstacle in executing sustainability programmes is the lack of significant external drivers. According to Young and Kielkiewicz-Young, only a few companies have launched sustainability programmes based on purely internal factors. Lack of knowledge and expertise are known to be just secondary implementation obstacles.

3 Improving Sustainability of a Transport Chain

As manufacturing companies want to improve sustainability of their transport chains, they need to decide the scope of an improvement programme. Many manufacturing companies have so large supplier base that it is not possible to manage every supplier separately through the change process. Thus, companies face important decisions: Should the company concentrate purely on the key suppliers or should it set some requirements for every logistics service provider? What could it require from the suppliers? Should the requirements be the same for all suppliers regardless of the transport mode or size of the supplier? And these questions are still just to name a few.

This chapter describes the framework of the thesis. First, the Subsection 3.1 examines how manufacturing companies could gather information on the sustainability performance of their suppliers and how they could monitor that the sustainability requirements are met in reality. Second, the thesis presents some guidelines on how manufacturing companies could control the change process and how they could commit suppliers to development. Supplier categorisation is described more thoroughly and the categorisation tool is presented. Finally, the Subsection 3.3 introduces the general principles on how the sustainability requirements for suppliers should be formulated.

3.1 Measuring the Sustainability performance of Suppliers

Measuring the sustainability performance of transport services consists of two main problems: how to gather information of suppliers' sustainability performance as well as how to evaluate the quality of their performance? Moreover, as discussed earlier in the Section 2.3, it is essentially important to link the sustainability assessment with regular performance assessment and decision making process.

Björklund (2005, 243-244) suggests that an effective way of gathering information about suppliers' environmental status is personal contact. According to her, this is more effective than gathering information via questionnaires or shall/ought to lists and it also increases suppliers' environmental ambition. Björklund continues that the most effective way would be using both personal contact and questionnaires to obtain information. Undoubtedly this is true but one needs to take into account the limits that reality sets for resources. A manufacturing company that has a large supplier base may find it very laborious to take personal contacts to every supplier, not to

mention the double method. In addition, many manufacturing companies may find personal contacts and the double method far too expensive. Thus, it may be profitable for most of the companies to divide suppliers into groups and give different guidance for them on the basis of the group's importance and need. But the companies that truly want to achieve efficient results and are prepared for large investments should undoubtedly consider the double method.

Reliable supplier monitoring is often claimed to be impossible task for manufacturing companies. There are incidents where a Western manufacturing company has asked for a certain ethical statement from an Asian supplier and it has also received one - even though the real performance of the supplier has not been organised ethically (Haltsonen 2004a, 122). Therefore, Haltsonen (2004a, 122) emphasises the role of the purchasers. The estimation of products' quality depends often on their professionalism, as they must be able to estimate what can be expected at a certain price.

As global manufacturing companies aim to develop the sustainability of their global transport chains, they face significantly different problems than at their home markets. Thus, it is a central issue to settle how the ethical performance of far-distance suppliers will be monitored. For example, Ikea and H&M are well-known as responsible buyers. Their organisations do not settle in written statements of sustainability performance but their local acquisition offices make frequent visits to the suppliers' mills (Grundström 2004, 26). This enables them to get at least somewhat more exact information on the working conditions at the suppliers' mills. Further, it would not be unreasonable for the local offices of other global manufacturing companies to arrange a few visits per year to transport suppliers' fleets and facilities. Although this arrangement costs and causes extra headache for purchasers, it is still justifiable: reliable performance monitoring may be very hard to execute differently. However, not all the effective and reliable monitoring methods are extremely costly or laborious. To some extent, this is also a matter of attitude: all the largest Western specialised chains of stores employ plenty of ethics specialists whereas, for example in Finland, there is no professional in this field (Haltsonen 2004b, 130-131). Besides, Finnish companies have not started to use external auditors or certification companies even though there are plenty of consultants in Asia that provide these auditing services.

If a manufacturing company does not want to invest lot of resources in the monitoring of suppliers and especially if its transport operates mainly in the Western countries, it may want to settle for questionnaires. In this case it is essentially important to thoroughly consider the aspects

to be measured in order to receive as exact information as possible. Maunu (2003, 66) has formed a diagram for describing the questionnaire creation steps (Figure 3-1). However, one needs to notice that although a manufacturing company would decide that it will gather sustainability information only with questionnaires, it is recommended that it organises at least a few random visits to suppliers' facilities to check that the information given in the questionnaire is valid. This arrangement does not require significant resources but raises a possibility of veracious answers, as there is a potential that the auditors will come to check the real performance of a supplier.

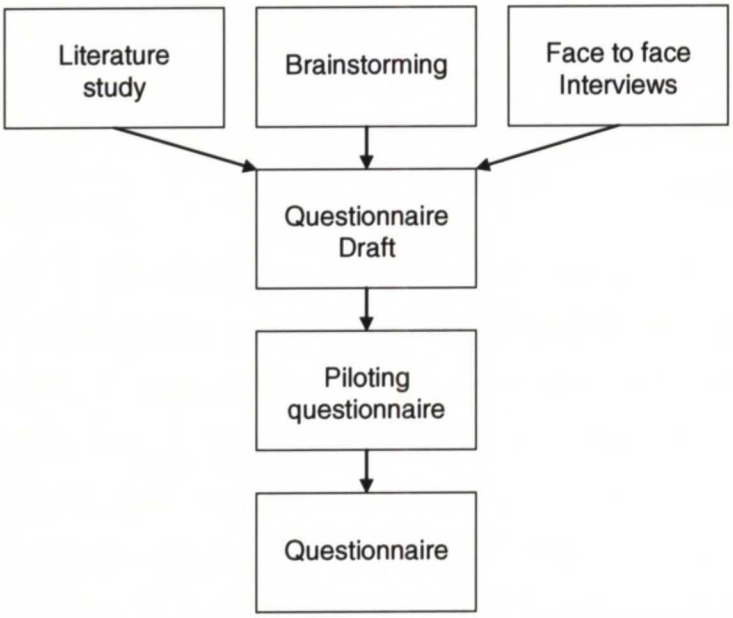

Figure 3-1 Questionnaire creation steps (Maunu 2003, 66)

To develop an appropriate questionnaire for suppliers' sustainability monitoring, a manufacturing company should formulate it with strict orderliness. Thus, it is recommended that the manufacturing company uses systematic approach when creating the questionnaire and measuring system. A useful example is to combine Maunu's model and the model by Keebler et al. (1999, 127) that was presented in the Section 2.3. Maunu's model concentrates more on the questionnaire creation itself whereas Keebler et al. refine the whole measuring system by iterating it. Thus, this combination would enable well-considered and appropriate measuring system. However, manufacturing companies need to define the assessment criteria themselves.

As mentioned above, companies should include sustainability assessment in the ordinary assessment of suppliers' performance. A good way for this is to follow the method of Keebler et al. where current performance measures are reviewed first and new measures are reconciled with them. It is recommended that the new estimation system would pay attention to multiple

performance areas like the balanced scorecard or the comprehensive supply chain measurement model that was presented in the Subsection 2.3. Furthermore, the best way for manufacturing companies to include sustainability as an essential part of the decision making process is to take purchasers into the assessment process. The ideal solution would be that the purchasers would estimate suppliers' sustainability performance themselves just before contract renegotiations. However, this may be impossible for some companies if purchasers are already overloaded with work tasks. In these cases the simplified measuring process would help the implementation and acceptance of the system.

If the manufacturing company is planning to delegate the sustainability measuring for the purchasers, it needs to notice that they are not usually educated with sustainability issues. Hence, the company should organise at least some education for the assessment process. The purchasers will also learn at the same time as they perform these estimations because they can compare the performance of a supplier with the performance of its rivals. It would be reasonable for a manufacturing company to take the purchasers into benchmarking process so that they could see what the world class sustainability performers are actually doing.

3.2 How to Manage the Wide Entity?

If a manufacturing company wants to achieve fame and competitive edge towards its competitors, it should show its sustainability ambitions at every level of the supply chain. This is true especially if the company has lots of small suppliers and can thus concentrate more thoroughly on only on a small part of them. If the company pronounces that it has improved sustainability of the transport chain but 90 % of suppliers have not heard of the improvement programme, the development efforts are easily seen as burnishing efforts of the company's image. Besides, it is very common that the major manufacturing companies work with environmental and corporate social responsibility aspects. If a manufacturing company wants to gain competitive edge with sustainability performance, it needs to be clearly better than its rivals. Thus, to ease the improvement process and reduce the amount of work, a manufacturing company that wants to improve sustainability should categorise the suppliers into different groups and manage them as entities. The company should also set certain sustainability requirements for every supplier, certain requirements for larger supplier groups and more detailed requirements for specific supplier groups. Figure 3-2 presents the framework for categorising suppliers in order to manage the change process.

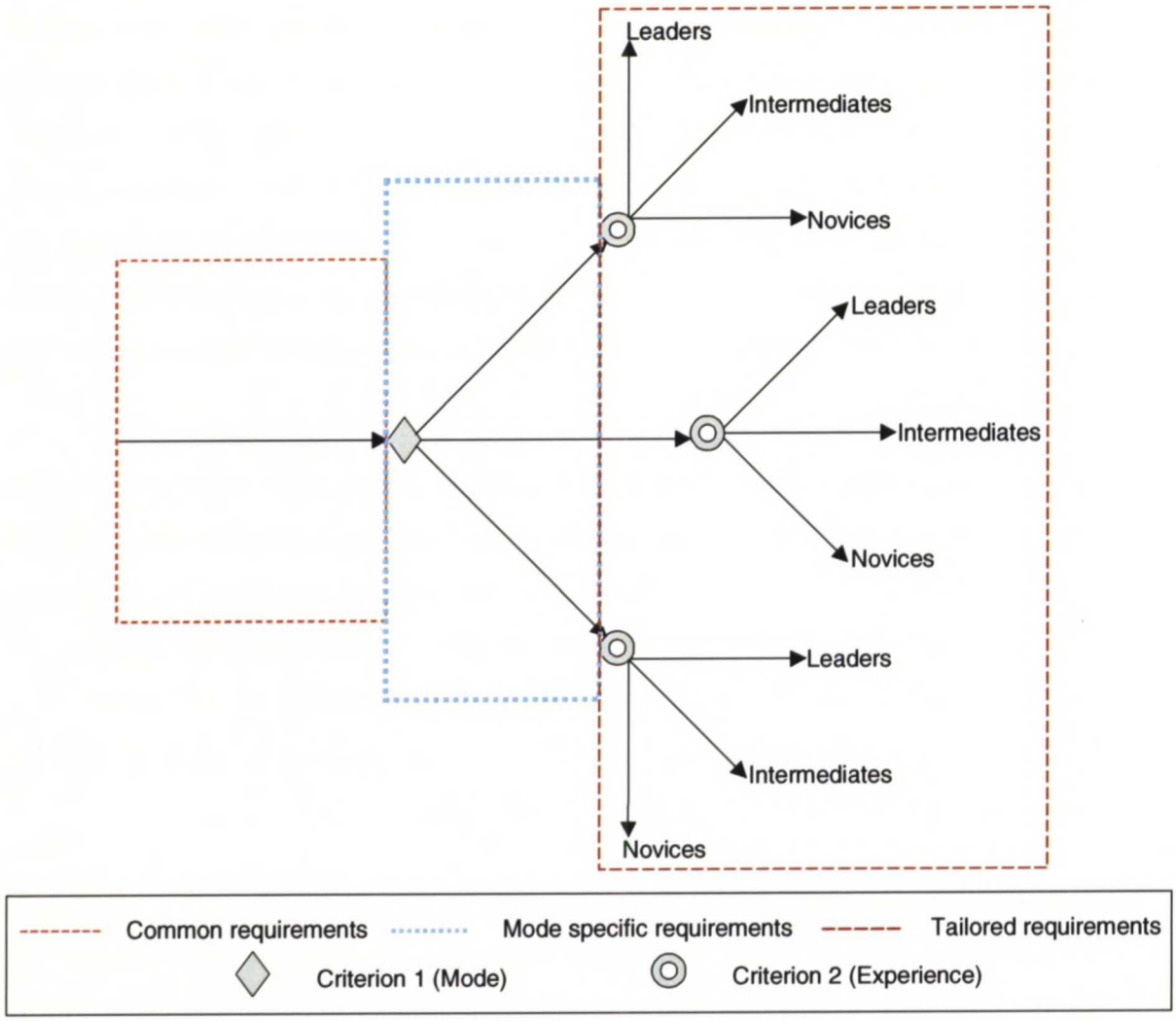

Figure 3-2 Framework for supplier categorisation

As illustrated in the Figure 3-2, the framework recommends that when improving sustainability of transport services, suppliers should be divided into different groups on the basis of two or possibly more criteria. The number of requirements should increase as the supplier moves along the frame. At the first stage, there are some common requirements that apply to all suppliers. After that, the suppliers are categorised on the basis of criterion 1, transport mode, and these groups are given additional requirements depending on the group features. Finally, suppliers are further divided into smaller groups on the basis of criterion 2, suppliers' earlier sustainability experience, and the requirements are tailored for these groups.

3.2.1 Supplier Categorisation

The framework aims at categorising suppliers into specific groups so that the buying company could set appropriate sustainability requirements for them and manage them as entities. When considering sustainability targets for transport suppliers, one should perceive the unique features

of the groups and the requirements they bring to the process. For example, the environmental impacts of road and sea transport differ remarkably from each other. The most important aspects that affect the possible requirements are transport mode, size and earlier sustainability experience of a supplier. The size in this thesis refers not to suppliers' turnover but to the size of fleets and amount of chauffeurs. It is not included in the framework as a separate criterion but purchasers should take that into account when estimating the sustainability performance of suppliers as the size may affect on the sustainability requirements of a supplier. Certain environmental performance can be excellent performance for a very small supplier whereas for a large supplier it can be unacceptable.

As a result of the categorisation, suppliers are divided into different groups on the basis of the transport mode that they represent as well as on the basis of their earlier sustainability experience. The supplier categorisation tool will be presented later in the Section 3.2.2.

Figure 3-3 illustrates the development of suppliers. The group of Novices refers to companies that have invested little or no resources for sustainability performance. The group of Leaders refers to logistics service providers that are very experienced in their sustainability performance and thus lead the way for other suppliers. Finally, the Intermediates refers either to the suppliers that have already started their sustainability programmes but have not yet received significant results or to the suppliers whose sustainability improvement efforts have become lazy after good start. The preliminary idea is that suppliers are continuously improving their sustainability performance. As supplier's improvements are significant enough, a supplier will be redirected to the next experience group. Finally, the experience group of the Novices will be vanished as the current suppliers move forward to the next experience groups. New suppliers are required to have some kind of sustainability policy already as they enter into the supplier base. As a result, a manufacturing company can truly say it has improved sustainability of its transport chain.

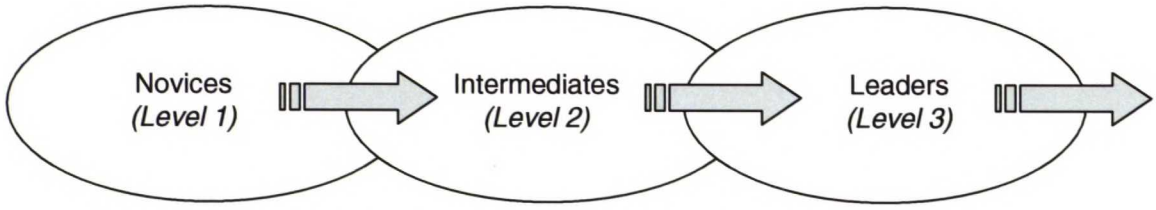

Figure 3-3 Experience development of suppliers

Although the categorisation of logistics service providers reduces the amount of work, it is still recommended that the manufacturing companies will downsize their supplier base as much as possible. Bagchi and Skjoett-Larsen (2003, 105) noticed in their research that during the supply

chain integration process many firms realised they have too large supplier bases. This complicated close relationships and information sharing with suppliers. Noticing this, many firms ended up reducing the supplier base as well as dividing the suppliers into different importance groups. Thus, it can be justified that downsizing the supplier base will ease the supply chain management. However, it is not always possible for a manufacturing company to reduce significantly the amount of transport suppliers without weakening the reliability of logistics services. If the capacity of permanent suppliers is temporarily not sufficient, a manufacturing company may need to arrange alternatives with other logistics service providers whose performance reliability it does not necessarily know that well.

3.2.2 Categorisation Tool

But how does a manufacturing company know which experience group a supplier belongs to? And what are the possible environmental and social aspects that a manufacturing company could consider when assessing the sustainability performance of a supplier? Next, the thesis presents a categorisation tool for the purchasers that shows the most common environmental and social aspects used in supplier assessment and that can be used efficiently for supplier classification. The picture of the categorisation tool can be seen in the Attachment 1.

A manufacturing company needs to define the environmental and social aspects it is going to use when estimating the performance of its suppliers. There are a wide range of aspects that can be used for this purpose but there is no unambiguous answer to which aspects should be taken under control. Hence, the companies that want to improve the sustainability need to ponder the most important special features of their performance as well as the value ranking of the organisation. It may also be reasonable to benchmark the companies that are more experienced in sustainability issues and see what they are actually doing.

To develop a categorisation tool that could be used in manufacturing companies of different industries over long time period, it is necessary to include a wide range of sustainability aspects as possible criteria options. The basic idea of the categorisation tool is that a manufacturing company decides what criteria it is going to use for estimation and performs an estimation of its transport suppliers. The person who estimates the suppliers summarises the results to the categorisation tool by selecting the pre-defined criteria and giving weights for each of them. After that, he scores (between 0 and 5) the suppliers and the tool counts the weighted score as well as weighted average on the basis of the results. Finally, the "Count" button is pressed and the tool gives the experience group that the supplier belongs to. Yet, the sum of weights needs to

equal one in order to receive a result. At the beginning the limits for different supplier experience groups can easily be 1.7 (one third of 5) and 3.4 as the idea is just to generally outline how much logistics service providers have worked with sustainability. Later the lower limits of the groups can be raised in order to change the group distribution of suppliers. For example, a manufacturing company may want to place 33 % of the logistics service providers in the group of Novices, 34 % in the Intermediates, and 33 % in the Leaders. However, it is important to notice that estimation criteria and their weights need to be defined by the manufacturing company itself as it knows best the special features of the industry and values of the company.

Although manufacturing companies need to specify the estimation criteria themselves, the categorisation tool suggests some criteria alternatives of which they can choose from. The most important environmental and social aspects for every transport mode have been gathered from interviews of the transport mode experts as well as from a small benchmarking of the world's top companies within sustainability area. As there are no leading forest companies that have already set sustainability programmes for their suppliers, the thesis concentrates on the companies from other industries (Ikea, Kesko, Nokia, Hennes & Mauritz, Stora Enso, Green Cargo and the VR-Group). Hence, this small benchmarking could be called as finding the best functional method. In addition, the transport mode experts from Stora Enso and from the Finnish Transport and Logistics SKAL were interviewed to gain the best perspective. The interviewed experts were Transport Manager Kauko Saarela (Stora Enso Ltd.), Logistics Manager Pekka Jalonen (Stora Enso Ltd.), Transport Environmental Manager Karin Nordell (Stora Enso Ltd.), and Logistics Manager Markku Maukonen (SKAL).

The idea of selecting the criteria options for the categorisation tool is that manufacturing companies could also change the criteria and still use the same tool. Hence, it is necessary to select a large variety of the most important and widely applicable criteria. Benchmarking and interviews of the logistics managers revealed that same sustainability aspects appeared often in suppliers' sustainability estimations. Also, the UN's Universal Declaration on Human Rights and the core conventions of the International Labour Organisation (ILO) are perceived in the list of social aspects. In general, the sustainability criteria can be divided into three classes on the basis of their nature: structural guidelines, environmental performance, and corporate social responsibility performance. The class of structural guidelines refers to the existence of sustainability policies, certificates, and sustainability principles that often form the basis for corporate sustainability work. Other classes refer to the real performance for environment and

CSR that companies are doing to improve their performance and reduce the environmental impacts of the operations. Figure 3-4 presents the classes of sustainability criteria.

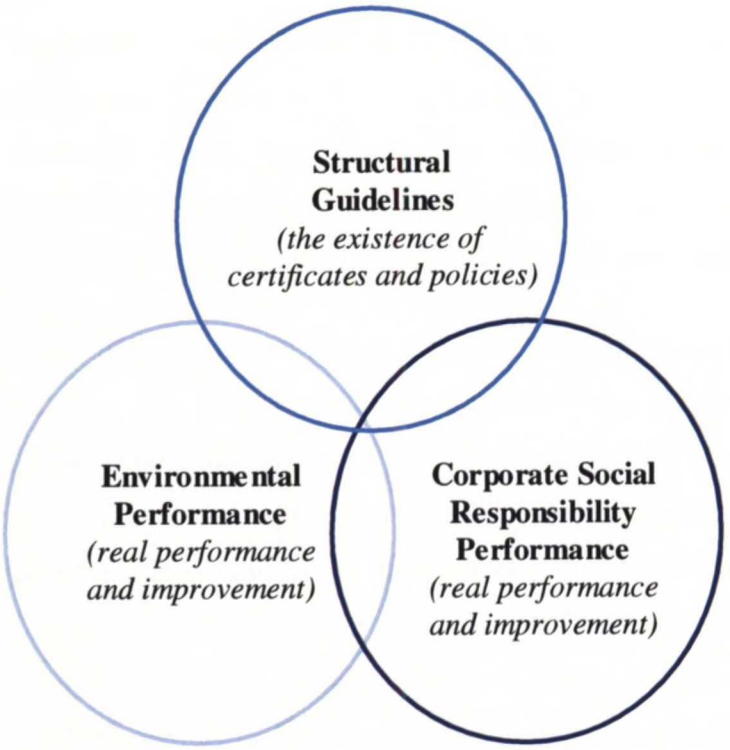

Figure 3-4 Classes of sustainability criteria

The most significant sustainability criteria that apply to every transport mode can also be classified on the basis of their nature. Thus, the criteria under the class **structural guidelines** are:

- Corporate Social Responsibility policy
- Diversity (discrimination against race, ethnic background, disability, gender, sexual orientation, religion, political opinion, maternity, or similar characteristics is prohibited)
- Environmental certificate
- Environmental management system (EMS)
- Environmental policy
- Free choice of employment (involuntary work is prohibited)
- Freedom of association (employees have right to join associations, bargain collectively and organise)
- Prohibition of child labour usage
- Remuneration (wages must be paid directly to employees)

The criteria used for measuring the **real environmental performance** are:

- Environmental training for the staff
- Reduction of energy consumption
- Sustainability requirements for sub-suppliers
- Training for eco-driving (chauffeurs know how to save fuel)
- Waste disposal
- Work against emissions

Finally, the criteria used for measuring the **real corporate social responsibility performance** are:

- Working conditions (safe and appropriate)
- Working hours (must follow the law)
- Fleet condition (safe and appropriate)
- Open communication between a buyer and a supplier as well as inside organisations
- Safety at work and at traffic
- Sustainability requirements for sub-suppliers

As seen in the Figure 3-4, the criteria circles are partly overlapping. This is due to the fact, that some criteria can be positioned to two classes or at least they affect significantly other classes: sustainability requirements for sub-suppliers belong both to the class of real environmental performance as well as the class of real CSR performance. Many social responsibility criteria are used as general performance principles but turned into real performance when monitoring the existing level of the performance. Furthermore, certificates and sustainability policies are often guiding the real environmental and social responsibility performance.

All these criteria were included in the categorisation tool although some of them are very difficult to measure, such as diversity, free choice of employment, freedom of association, and open communication. These criteria are grounded on the attitudes on individual employees and are too abstract for exact measuring. However, the violations of these criteria reflect to employee satisfaction. Therefore, employee satisfaction has been added into the categorisation tool as an extra aspect. Another extra criterion is general sustainability improvement. Although a company may seem to be experienced in sustainability issues, it has not necessarily worked a lot during the previous year. It is always easy to refer to environmental certificates and corporate principles but the work in practise may be rather passive.

To enable the wide usage of the tool, the criteria list needs to include also criteria that are specific for certain transport mode. However, it is important to notice that the mode specific sustainability criteria consist only on the criteria belonging to the classes of real environmental and social responsibility performance. This is due to the fact, that the criteria class of structural guidelines is independent on transport modes. Every transport supplier can formulate sustainability policies and register against certificates. Table 3-1 presents the mode specific sustainability criteria that were included in the categorisation tool.

Table 3-1 Most important mode specific sustainability criteria

Road	Rail	Sea
Environmental	***Environmental***	***Environmental***
▪ Fuel type ▪ Engine type ▪ Reduction of emissions ▪ Reduction of empty mileage ▪ Training for eco-driving	▪ Engine type (electric vs. diesel) ▪ Chemical usage ▪ Eco-driving ▪ Refinement of polluted soil ▪ Environmental training of staff ▪ Reduction of emissions and energy ▪ Reduction of noise and vibration	▪ Bunker type ▪ Waste disposal ▪ Reduction of emissions and energy
Corporate Social Responsibility	***Corporate Social Responsibility***	***Corporate Social Responsibility***
▪ Traffic safety ▪ Working hours and resting times ▪ Sustainability monitoring of sub-suppliers	▪ Traffic safety	▪ Working conditions ▪ Safety at work *(Overseas transport:)* ▪ Monitoring of child labour usage ▪ Freedom of association ▪ Remuneration ▪ Free choice of employment

Like the sustainability requirements that apply to all transport modes, also the mode specific criteria in Table 3-1 are collected with benchmarking and interviews of logistics managers. The criteria list bases on the most significant weaknesses of certain transport modes. For example traffic safety in road transport includes monitoring of drink-driving, load securing, and observance of speed limits. The sea criteria are divided into general part because the long-distance sea transport causes extra requirements for sustainability monitoring.

3.2.3 Committing Suppliers to Development

There are several incentive possibilities for encouraging transport suppliers to sustainability improvements. A manufacturing company that wants to start a sustainability improvement programme needs to define how much resources it has for incentives and what incentives does its suppliers appreciate the most. Although incentives often lead to better collaboration and better performance, they are not free of cost. Thus, the manufacturing company should consider the returns and costs of incentive programmes.

If a manufacturing company has valued sustainability improvement as a top issue, it should also sacrifice resources for the programme. This is due to the fact that large-scale incentive

programmes often enable efficient development, and suppliers seek evidence of the buyer's commitment. If a manufacturing company provides training and problem solving for its suppliers as well as offers lucrative incentives, such as a better price for successful development, it is easy for suppliers to believe in this development and buyer's commitment. However, as these incentives may be rather expensive, every manufacturing company may not adopt them.

If a manufacturing company finds sustainability improvement important but does not possess large resources for incentive programmes, it needs to find other ways to commit suppliers. However, it should realise that all effective incentive programmes do require some resources. Furthermore, the buyer cannot necessarily choose the cheapest supplier if it wants to keep its decisions in line with the improvement programme. There are also effective ways of commitment that do not require large resources. The buying company should show that its top management is involved in the change process. For example, it could promise future business for the suppliers that have succeeded in sustainability improvements and performance reliability; it could take suppliers' suggestions of the change process into account; and it could publish yearly comparisons of the suppliers' development. Some companies even arrange annual sustainability competitions for their suppliers.

As discussed earlier, commitment is the key element of successful collaboration. This applies to every development programme whether the buyer has lots of resources for it or not. Other significant factors for commitment were open dialogue between the participants and trust that originate from the relationship history. Thus, the thesis presents next a common framework that should be used as a basis of collaboration development programmes (Figure 3-5).

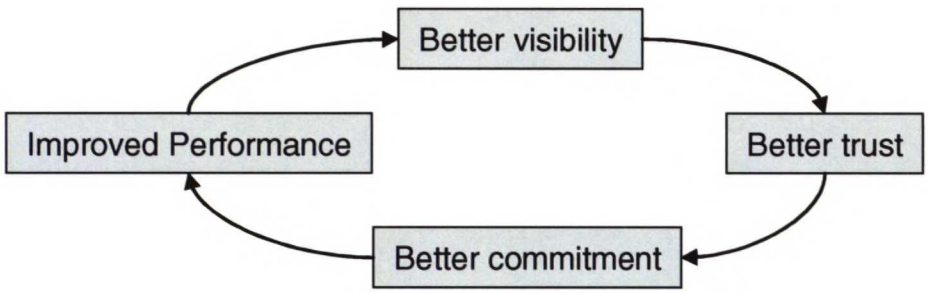

Figure 3-5 Committing suppliers to collaboration

As illustrated in the Figure 3-5, when collaboration participants increase visibility and open dialogue with each other, it is easier to build mutual trust as they know more about the workings and intentions of other participants. Trust, for one, increases commitment to collaboration. Commitment to collaboration leads further to improved performance as the collaborators are

stretching their skills and resources to reach the desired outcome. This, again, eases the visibility between participants once the performance becomes competent. Visibility in this thesis refers to open communication between collaboration participants of their future intentions, expectations, and performance. As this framework does not require lots of resources but only mutual will, it is recommended that buyers take it as a basis of their commitment programmes to which they can combine other incentives. In addition, whether a manufacturing company uses lots of resources or not, it should make sure that its suppliers' sustainable development is truly measured and the purchasers take the results into account in contract negotiations.

3.3 Sustainability Requirements

As discussed earlier in this chapter, the idea of the supplier categorisation framework is to divide suppliers into different groups, manage them as entities, and set sustainability requirements for them. Because all manufacturing companies differ from one another, it is not possible to define universally applicable sustainability requirements. Hence, manufacturing companies should define requirements themselves. Companies can find useful hints for these requirements from benchmarking more advanced companies but also from the guidelines of the United Nations and International Labour Organisation.

3.3.1 Common Requirements

Common requirements in the supplier categorisation framework refer to the minimum sustainability requirements that apply to every transport supplier of a manufacturing company. A natural basis for these requirements is the international legislation of the geographical area to which a manufacturing company adds the environmental and corporate social responsibility requirements that it wants all of its logistics service providers to fulfil. However, a manufacturing company behaves to ensure that these requirements are not too strict, as it should co-operate only with suppliers that really fulfil the requirements. Furthermore, the common requirements apply to every country and continent, which lowers the requirement level. The best way to illustrate the formulation of common requirements is to formulate them into an equation. Thus, the common requirements (CR) should be:

$$CR = l_g + n + c, \qquad \text{where}$$

l refers to laws, g refers to geographical location, n refers to the environmental minimum requirements defined by a manufacturing company, and c refers to the Corporate Social Responsibility requirements defined by a manufacturing company. As the common requirements

are considered as minimum requirements that every logistics service provider needs to fulfil, they should also be defined precisely so that it would be easy to see whether a supplier conforms to them or not.

3.3.2 Mode Specific Requirements

When suppliers have been divided into groups on the basis of the transport mode, a manufacturing company sets them more requirements. These mode specific requirements are also minimum requirements that apply to every supplier in a certain group and are originally defined by manufacturing companies. However, it is important to notice that also common requirements apply to these supplier groups. Therefore, these mode requirements (MR) should be formulated as:

$$MR = CR + g(m_n + m_c), \quad \text{where}$$

CR refers to common requirements, g refers to geographical area, m_n refers to the environmental transport mode requirements defined by a manufacturing company, and m_c refers to the Corporate Social Responsibility requirements for transport modes.

These group requirements are already much more precise than the common requirements. Therefore, one should also consider the geographical location where a supplier performs. It is not possible to set reasonable requirements without paying attention to location: otherwise the requirements would be either far too strict for certain areas or far too loose for Western suppliers. Thus, the geographical variable g serves as a two-way catalyst that either strengthens or softens the environmental and social mode requirements.

3.3.3 Tailored Requirements

Finally, the tailored requirements are given to the supplier experience groups that are formed on the basis of suppliers' previous sustainability performance. The idea is that suppliers should develop their sustainability continuously if possible. Moreover, the suppliers that have worked much within a sustainability area (the Leaders) are required even more whereas the suppliers that have not done anything within a sustainability field (the Novices) need to start from the basics. However, one should consider the size and geographical location of a supplier. If a large supplier has not done anything, it is required to develop its operations rather rapidly. And if a small supplier has done as much as it is reasonably possible for small suppliers, it will not be required to develop its operations before there emerges some rational improvement areas. In other words,

purchasers need to use their discretion when negotiating of the requirements with logistics service providers.

Diverging from earlier requirements, tailored requirements are not minimum requirements. They are defined by a manufacturing company and they should be seen as recommendations on how it would like its supplier groups to develop their sustainability performance. But even though the tailored requirements are not compulsory, they should be used as a basis of supplier evaluation and contract negotiating process in order to encourage suppliers to fulfil the requirements. As mode specific methods, also the tailored requirements include the requirements of the earlier stages. Thus, the tailored requirements consist of compulsory common requirements, compulsory mode specific requirements, and voluntary tailored requirements. The tailored requirements (TR) can be described as:

$$TR = MR + s \cdot g(x_{nm} + x_{cm}), \qquad \text{where}$$

MR refers to mode specific requirements, *g* refers to geographical area, *s* refers to supplier's size, x_{nm} refers to environmental experience group requirements for a certain transport mode and x_{cm} refers to Corporate Social Responsibility requirements for a certain experience group and transport mode. Both x_{nm} and x_{cm} are again defined by manufacturing companies.

As an outcome of the supplier categorisation, all suppliers are given common, mode specific and tailored requirements. As these requirement groups include previous requirements, tailored requirements represent the total requirements set for supplier groups.

4 Case Stora Enso Ltd.

This chapter presents first the organisation of Stora Enso Ltd. as well as its transport chain of the end products. After that, the present sustainability situation in the Nordic Market is being reviewed.

4.1 Presentation of Stora Enso Ltd.

Stora Enso Ltd. is a manufacturer of paper, packaging and forest products. It is a global market leader in publication and fine papers, packaging boards and wood products that are also its main products (Stora Enso 2005a, 2). Stora Enso was founded in 1998 as Swedish Stora and Finnish Enso merged together. The company operates in 5 continents and over 40 countries and has approximately 45 000 employees. The sales totalled in EUR 12.4 billion in 2004, the production capacity of paper and board was 16.4 million tonnes, and the capacity of sawn wood products totalled in 7.7 million cubic metres.

The main markets of Stora Enso are Europe, North America and Asia where the Group has also located its production facilities (Stora Enso 2005a, 2). The company deals mainly in business-to-business markets. The majority of customers are large and small publishers, printing houses and merchants, and packaging, joinery, and construction industries.

Stora Enso has invested in improving its sustainability. All pulp, paper and board production units of Stora Enso Ltd. are covered by ISO 14001 certification or EMAS registration except for the most recent acquisition in Poland (Stora Enso 2005b, 14). In addition, Stora Enso is included in Dow Jones Sustainability Index (DJSI World) and FTSE4Good index.

Stora Enso has worked rather hard with sustainability issues and considers sustainability as one of the Group's success factors. The implementation of Corporate Social Responsibility principles was started in 2004 at unit level (Stora Enso 2005b, 34) and now the company has given a task for Stora Enso Transport and Distribution to extend it to the transport chain. Hence, as this request came from the top management, also the middle management should be committed to this programme.

4.2 The Transport Chain of the End Products of Stora Enso

The transport of Stora Enso's end products is co-ordinated by a separate department, Stora Enso Transport and Distribution (SETD), and individual suppliers take care of the actual transport.

The organisation chart of Stora Enso is presented in the Figure 4-1. SETD is a support function under Market Services. As illustrated in the figure, the organisation chart of Stora Enso follows the pattern of multi-divisional organisation with multiple support functions.

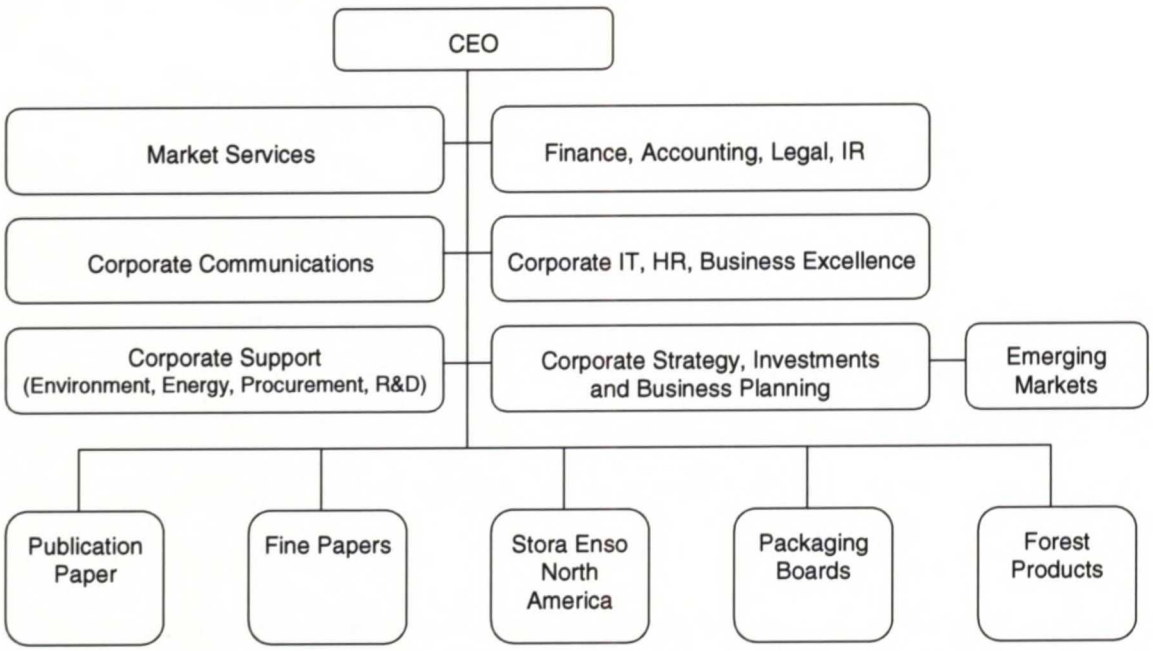

Figure 4-1 Organisation chart of Stora Enso Ltd. (Stora Enso 2005c)

The main responsibilities of SETD are procurement of transport services, co-ordination of product flows, storing and distribution of the Group's products, as well as producing information on the related topics, such as profitability calculations (Stora Enso 2005d; Nordell 26.8.2005). It takes care of the end products of the Group but the transport of raw wood is at the responsibility of Stora Enso Wood Supply. The annual transport volume of SETD is approximately 22 million tons (Stora Enso 2005e).

Stora Enso uses inter-modal transport when delivering end products abroad. It has just recently launched the new North European Transport Supply System, NETSS, and has thus concentrated its product flows on the hub-and-spoke system. The main hub is located in Gothenburg but also in Finland the goods are concentrated mainly to the ports of Kotka, Kemi and Oulu.

Figure 4-2 presents the simplified logistic chain of the end products to the extent that this thesis examines. In reality there are several mills, ports and inventories in the logistic chain. The thesis does not cover overseas transport but concentrates on the sustainability aspects of the transport chain until the end port in Europe or the port hub in Gothenburg.

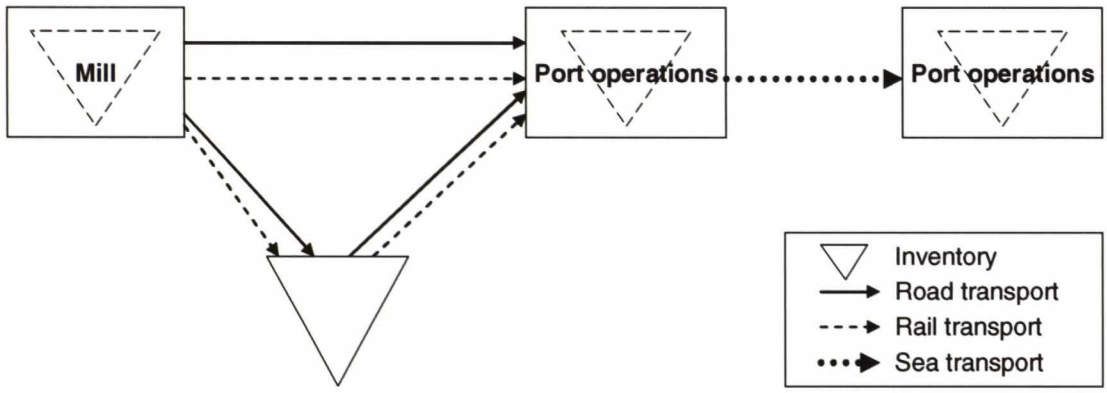

Figure 4-2 Examined logistic chain in Stora Enso Ltd.

As illustrated in the Figure 4-2, the end products are transported from the mill inventories either directly to the ports and port inventories (most of the goods in Finland) or alternatively they are transported temporarily to intermediate stock. At the port the goods are stored, forwarded, and loaded into the ships. After that, the goods are transported directly to European port towns or via the port hub in Gothenburg to their end destinations or other hubs. However, as Stora Enso is moving towards the new NETSS system, most of these direct European short-sea transports are ceased and the goods are routed via Gothenburg hub. The following sections of this subtopic describe the special features of the transport chain of Stora Enso that should be taken into account when considering sustainability improvement programme.

4.2.1 Road Transport

Stora Enso has a very large road supplier base as most of the road suppliers are small or medium-sized companies. The number of land transport suppliers only in the Nordic countries is 133 but there are over 400 separate transport contracts with the suppliers (Vehviläinen 18.5.2005). Moreover, SETD does not handle all the end product deliveries because for example in Finland the mills make the contracts with local transport suppliers that make direct transports from the mills to the domestic end customers. Considering these small local suppliers, there are 130 road transport suppliers already in Finland (Saarela 1.6.2005).

According to Stora Enso's Transport Manager Kauko Saarela (1.6.2005), the contracts of the road suppliers are renegotiated approximately once a year. Half of the suppliers have long-term contracts whereas the rest of the suppliers are competing more to win a contract. Approximately 50 % of the decision criteria emphasises the cost issues and the other 50 % the performance quality with long-term suppliers. However, there are no official corporate guidelines on the purchasing criteria, so basically they need to use their personal expertise on the selection. Although the cost pressure is constant in the logistics, Stora Enso has kept the price level

reasonable for the permanent suppliers in order to enable them to evolve their operations. Nevertheless, it is not possible to make significant price reductions without loosing the smallest suppliers. Besides, the price criterion is more important with incidental transports.

The road suppliers of Stora Enso have so far taken care of their sustainability issues in very various ways. In general, there are huge differences resulting from the size of the suppliers as well as from the geographical area of the suppliers. The large suppliers are taking better care of their sustainability issues than small suppliers, the Nordic suppliers are managing sustainability better than Central European suppliers, the Western suppliers are managing sustainability better than the Eastern suppliers and so on. Hence, it is not possible to define general sustainability requirements that apply to every supplier and still require everyone to develop their operations.

To improve sustainability of the transport chain, the purchasing managers of transport services assembled a meeting to outline the most significant CSR problems of different transport modes. According to the meeting, Stora Enso should concentrate on community involvement and working conditions with the Western road suppliers. For Stora Enso's point of view, community involvement includes traffic safety, such as following speed limits, securing loads, monitoring the working hours of drivers, using drug-free chauffeurs. Especially the working hours and resting times of drivers were seen as relevant aspect that should be monitored. However, the company should still outline the CSR focuses for the non-Western countries as there may come out other important CSR aspects that are already well-managed in the Western countries.

Most of the environmental factors that the company wants to monitor have already been identified. Stora Enso has earlier carried out enquiries for their key suppliers to find out how much they have worked within environmental field. The questions have handled identifying of environmental aspects, environmental management systems and policies, fulfilment of legal requirements, environmental programmes including reduction of emissions and energy, as well as healthy and safety programmes. The questionnaire can be seen in the Attachment 2.

4.2.2 Rail Transport

Rail transport is almost always oligarchy or even monopolistic business. The industry is often strictly regulated by the laws and therefore also sustainability may be better organised in these companies. As there are not that many rail suppliers in one market, it may be difficult for a manufacturing company to pursue suppliers to develop their operations beyond the legal level. Nevertheless, road transport is an alternative for rail transport and therefore rail suppliers are

often willing to improve their operations when key customers ask it. Also, manufacturing companies can use other commitment methods, such as enhanced collaboration and visibility towards rail suppliers in order to encourage them to sustainability improvements.

When deciding on land transport modes, the most important selection criteria at the moment are urgency and size of an order, flexibility of the mode, location of a mill, environmental friendliness, as well as the need for the return transports (Saarela 1.6.2005). The cost factor has less important as a decision criterion because the cost of rail transport is often that close to road transport. In general, Stora Enso aims to increase the proportion of rail transport as it is more environmentally friendly transport mode. Therefore, the purchasers have official guidelines to select rail transport whenever it is reasonable. Furthermore, the new NETSS system will bring new Stora Enso Cargo Units, SECUs, to North Europe. SECUs are larger cargo units than the standard rail units and they are developed by Stora Enso. The idea is to combine product flows, reduce the amount of paper reel handling and thus to reduce the damages. However, Finnish rails are not ready for these new units due to their huge weight. The Finnish Rail Administration will modernise the rail network but, anyhow, the new SECUs will not be transported directly to the Finnish mills for a couple of years.

When considering rail transport in the Western countries, there are not that much CSR imperfections in the industry. Therefore it is a small problem to identify the most important sustainability aspects that should be taken into consideration when assessing the performance of the suppliers. Also the Stora Enso's transport purchasers found it difficult to identify the CSR aspects since the only important aspect that came up was community involvement like in road transport (Stora Enso 2005f). However, in the markets where the general CSR is well handled Stora Enso can concentrate more on the environmental issues rather than social responsibility issues.

4.2.3 Sea Transport

Unlike in the road transport, there are not that significant size differences between sea suppliers that it would affect the sustainability requirements of the suppliers. However, the geographical differences may be huge and therefore Stora Enso should thoroughly define the criteria for the Far-Eastern and other non-Western suppliers. Furthermore, when expanding the sustainability improvements programme to the other continents, the company should consider alternatives on monitoring reality of the suppliers' performance for instance with the help of external auditors.

As mentioned earlier, this thesis does not cover overseas countries but the framework is applicable for them.

In addition to short sea and overseas suppliers, Stora Enso has inland waterways suppliers. This transport mode is rather strictly regulated by the law and therefore the inland waterways suppliers have usually organised sustainability issues better than sea suppliers. Due to the stricter regulations, it might be reasonable for Stora Enso to define separate inland waterways criteria to set them apart from sea suppliers. However, this thesis has not examined inland waterways suppliers but has reviewed the operations of Finnish inland ports.

As discussed above, Stora Enso has renewed its transport chain into hub-and-spoke system. This has affected especially the sea transport. The number of sea transport suppliers in the Nordic markets has decreased and the company is more dependent on the selected suppliers. Unlike in the past, the contract period is very long in the new NETSS system, up to ten to fifteen years (Jalonen 18.5.). This complicates the possibilities of Stora Enso to encourage the sea suppliers to improve their sustainability performance in context with contract renegotiations. Nevertheless, the partnership is important also for the suppliers so the company can encourage them with other committing methods.

In the past, the most important criteria when selecting the transport mode were cost, urgency, and the locations of the customer and the mill (Jalonen 10.6.2005). However, as the new NETSS system will standardise the product flows, these criteria are loosing their importance. In spite of the reduced importance of usual performance estimation criteria, sustainability of the sea suppliers still needs to be assessed. The transport purchasers defined reliable communication and good working conditions as the most important CSR aspects of the Western sea suppliers. Also the working hours and reduction procedures of the workforce were considered important.

4.2.4 Port Operations

One of the most important global distribution decisions is the selection of the port, as wrong selection incurs extra time and cost to the shipment (Coyle et al. 2003, 170). As Stora Enso has concentrated its production flows into the hub-and-spoke system, it has also become more dependent on port operations.

An interesting feature of the port operations is that the administrative operations belong to the port town, whereas the cargo operations are at the responsibility of the stevedores. The most important CSR aspects in the port operations that are managed by stevedores are reliable

communication, working conditions, and working hours (Saarela 16.6.2005). The most important environmental aspects are emissions to the air, condition and environmental friendliness of machinery, and disposal of hazardous waste (Saarela 1.6.2005). In addition, noise and dust are significant side effects that need to be monitored with port operations (Vehviläinen 23.8.2005).

4.3 Present Sustainability Situation in the Nordic Market

Nordic Council (2005, 83) has published its latest sustainability study of the Nordic companies. According to the study, the Nordic companies have managed sustainability matters really differently. In general, it seems like the large companies are making more effort to improve and report their sustainability performance, whereas only a few small and medium-sized companies have reached high management awareness in this area.

According to Nordic Council (2005, 84), Stora Enso is among the top ten companies in the Nordic countries when it comes to sustainability. Its sustainability report is verified by an independent third party and the sustainability issues are reported robustly. However, the study reveals that the majority of sustainability pioneers operate in the businesses that have a high potential risk on sustainability issues, such as forest industry. Because the paper and wood industry belongs to this group, also the competitor's of Stora Enso have handled sustainability issues rather well. This is also supported by the fact that in the case of forest industry, the public interest focuses on the primary producer rather than other supply chain members (Roberts 2003, 166). As most of the forest industry companies are taking their sustainability issues well, Stora Enso needs to take a serious stand for sustainability work to stand out from its rivals and gain competitive edge through ethical performance. Yet, Nordic Council remarks that there is no firm evidence that well-managed sustainability correlates with financial benefit and different kind of ownership.

An interesting notice in the study of Nordic Council was that the Nordic companies under examination were least interested in supply chain matters and community involvement (Nordic Council 2005, 85). European companies tend to focus less in the local community, charity, and cultural donations than the typical American companies and they were more concentrated on employee relationships. What comes to supply chain focus, Nordic companies have not shown notable interest in supply chain sustainability. According to Nordic Council, companies find it hard to control sustainability issues at the supply chain level. Moreover, supplier demands are the latest area of sustainability, which means that companies may not yet have realised its importance.

5 The Supplier Categorisation Framework at Stora Enso

To gain the most of the framework, it needs to be adapted to the business of the case company. This chapter presents the recommendations for the sustainability improvement process of Stora Enso's transport chain. First, the thesis examines how the case company could gather information of their suppliers' sustainability performance and how it could assess the performance. Second, the criteria of the categorisation tool are presented and the functionality of the tool is tested. Further, the thesis suggests some commitment methods that would suit the present situation of the case company. Third, the suggestions for sustainability requirements are presented. Finally, some general observations of the present situation are presented and the recommendations are summed up in the last subsection.

5.1 Assessing the Sustainability performance of the Suppliers

When developing the sustainability measurement system, one should first find out what kind of measurement system is really needed. It is no use in wasting resources in systems that are developed only for the sake of formality. Therefore, the measurement system should cover financial, operational, and sustainability aspects alike. The measurement system for sustainability improvement programme that is presented in this subtopic is created by following the general model of Keebler et al. (1999, 127), which was introduced in the Section 2.3. The system is thus generated on the basis of the previous measurement systems of Stora Enso and its purpose is to integrate the sustainability measurement system with other performance estimations of the suppliers.

The performance of the logistics service providers has previously been assessed by the ten criteria questionnaire. The results have then been reported to the suppliers so that they were able to compare their performance with their rivals. The thesis recommends that the sustainability aspect is taken as one additional criterion in this assessment. The total sustainability score would be derived from the weighted average of the ten criteria questionnaire that is presented later in this chapter.

In the past, Stora Enso has monitored the mostly environmental performance of its key suppliers. To really make a difference in the transport chain, the company should extend some sustainability requirements to every level. The work amount would be feasible if the suppliers were managed as entities. The company could then perform more detailed analysis on the key suppliers and consider more intensive collaboration within the sustainability field.

The current questionnaire that has been used for the environmental estimation of the key suppliers needs to be adapted slightly to enable the best benefit from the examination. **First**, the grading of the questionnaire has not enabled the ranking of the suppliers, as its purpose has been to ensure that the key suppliers fulfil the sustainability targets of Stora Enso. Therefore, a supplier receives the same score whether he has an environmental certification or whether he does not have an environmental certification but plans to introduce a certificated environmental management system within two years. This is due to the fact that success in some questions in the current questionnaire has transferred a supplier directly to the group of approved suppliers so the grading has not been that important. However, a supplier that is not certified officially has actually an opportunity to gain more points than a certified supplier as the following questions give one point each and a certified company is not expected to answer them. The new updated questionnaire makes a difference between the intentions and actual performance as well as gives the case company an opportunity to rank the suppliers based on their superiority. The current questionnaire can be seen in the Attachment 2. The suggestion for new sustainability questionnaires can be seen in the Attachment 3. The updated questionnaire consists of the common part and mode specific parts.

Second, to adapt the questionnaire for the large supplier base, the number and character of the questions has to be altered. At the moment the questionnaire has 23 multiple choice questions with "yes" and "no" answer alternatives. However, the conceptions of a decent sustainability level may vary significantly between the suppliers. A supplier may think they have an environmental policy if they have discussed it during the coffee pause, whereas another supplier has really made an effort to change the performance before stating that they have an environmental policy. This problem comes up especially if the answer alternatives are only "yes" or "no". Therefore, to improve the reliability and quality of the questionnaires, one should increase the number of answer alternatives as well as attach open questions to the questionnaires in order to ensure the real state of suppliers' sustainability performance.

Third, to perceive the special features of each transport mode, the updated questionnaires are separated into different mode questionnaires. In other words, the questionnaire consists of the common questions that are asked from every logistics service providers, and mode specific questions.

Finally, to enhance the purchasers' commitment to the change, the number of questions should be limited to ten most important ones. This is due to the fact that the other aspects of suppliers'

performance are estimated with ten criteria questionnaires. Hence, it may be difficult to commit the purchasers to assess only sustainability with 23 questions. Nevertheless, open questions cause more work if one tries to estimate the performance only based on them. Thus, the recommended questionnaires have both multiple choice questions and open questions. This offers the purchasers the possibility to check the questions quickly but also offers them the possibility to check the real level of sustainability performance. If the purchasers are overloaded with their work, it is also possible to conduct the enquiries once in two years. This means that half of the suppliers would be examined in odd years whereas another half was examined in even years. After all, the sustainability improvements do not necessarily happen that quickly. Yet, if sustainability estimations could be conducted annually, the questions could be changed from year to another to ensure the extend view of the real sustainability performance.

The supplier estimation criteria have been the same for several years in the case company to enable the monitoring of the supplier development during the review period. However, this is not the best approach to be used when assessing the sustainability because the field is developing fast and the focus may need to be altered as the suppliers develop their operations. Besides, the company may want to monitor other criteria next year in order to gain more extended overview of the situation if it needs to concentrate only on the ten most important criteria annually. In addition, the suppliers may find it more meaningful to answer varying questions instead of an annual questionnaire with repetitive questions. Therefore, it is sufficient to make annual comparisons and indicate where a supplier is located in the sustainability field in relation to its rivals.

The grading of the questionnaire proved to be slightly problematic in the case company. This is due to the dispersed performance measuring system in the organisation. The whole supplier estimation is handled differently inside the country and between the countries. For example in Finland the supplier estimation is scaled at the moment from 1 to 10. As the sustainability estimation needs to be adapted to existing supplier assessment systems, the scaling from 0 to 5 was considered the best for this sustainability estimation. It is thus needed to proportion the scores to fit with the normal supplier estimation. But whatever supplier estimation system is used in other countries, it is recommended to include this sustainability estimation system as an essential part into it and proportion the scores to fit with it.

5.2 Managing the Change Process

It is recommended that the case company extends the sustainability improvement programme to apply to every logistics service provider. The suppliers should be categorised on the basis of transport mode and their earlier experience level. These supplier groups should thus be managed as entities but still consider the size and the geographical location of a supplier. Furthermore, the case company should carefully consider whether it could afford to reduce the number of suppliers to ease the management of the change process. At least within the Finnish road transport there should be approximately 20 % allowance of supplier base reduction on the less frequent routes (Saarela 1.6.2005).

As the idea of the sustainability improvement process is to achieve long-term results, this process can be described as process-oriented development. Thus, Stora Enso should aim to increase the suppliers' own abilities to improve their performance and it could consider advising the suppliers on the most important sustainability aspects. As the purchasers do not meet all suppliers often, they could utilise their contract negotiation meetings to lobbying for sustainability improvements. Table 5-1 presents other sustainability strategies that SETD should consider in its sustainability improvement process. The recommendations are modified from the list of sustainability strategies by Young and Kielkiewicz-Young presented in the Section 2.5.2.

Table 5-1 Recommended sustainability strategies for Stora Enso (modified from Young & Kielkiewicz-Young 2001, 264-265)

Strategies that aim to enhance collaboration between participants:
1) Communicating to suppliers about the sustainability policies and values of the Company to enable the suppliers to follow them
2) Building closer and more open relationship with suppliers
5) Developing priorities together with suppliers also when negotiating the experience level requirements
Strategies that aim to intensify the operations of an organisation:
6) Conducting frequent assessments of the suppliers' sustainability level
7) Training the purchasers the most important sustainability aspects and the used sustainability criteria of the suppliers to help the purchasers to assess the performance of the suppliers
9) Benchmarking the world's top companies among sustainability to monitor the current tendencies and co-operate with some companies
Strategies that create a basis for collaboration:
10) Setting pre-qualification criteria for new suppliers after the current suppliers are taken into the sustainability programme
12) Persuading the current suppliers to reach certain sustainability level through sustainability criteria in the contract renegotiations

The list of sustainability improvement recommendations for Stora Enso includes strategies from every group. Thus, the company should at the same time improve its internal operations and collaboration with the suppliers as well as use contractual ways for strengthening the joint rules. Although the recommendations consist of many strategies, they should be seen as one larger sustainability strategy with multiple stages. The stages support one another and their successful implementation may lead to significant sustainability improvements.

5.2.1 Criteria of the Categorisation Tool

As discussed above, purchasers' amount of work caused by the assessment needs to be feasible to ensure the extensive usage of the framework. Due to this aspect and to reconcile the new measuring system with the current one, it was recommended to concentrate on the ten most important sustainability criteria. The criteria that were used in the categorisation tool can be divided into two sections: general criteria and mode specific criteria. This means that some of the questions were asked from every supplier whereas some questions depended on the special features of the transport mode.

The general criteria used with every supplier were:

- Environmental policy
- Corporate Social Responsibility (CSR) policy
- Environmental management system (EMS)
- Environmental certification
- Work for emission reduction
- General improvement in environmental and/or social responsibility performance
- Employee satisfaction

The basic idea with the general criteria was to point out the real state of the suppliers' sustainability experience. As the certification itself does not guarantee active development processes, the suppliers were asked to describe the most significant sustainability achievements from the previous year. Employee satisfaction was selected as a criterion because it reflects effectively the psychological well-being of an organisation and it reveals if there is discrimination or other injustices. However, companies do not readily report the exact results of the employee satisfaction researches. It was therefore decided to ask whether a supplier monitors employee satisfaction and whether it has done improvements on the basis of the results. The criterion of emission reductions includes noise and vibrations with rail transport and noise and dust with port operations. The number of general criteria was bigger than the number of mode

specific criteria because most of the important criteria apply to every transport mode. As it was needed to concentrate on ten most significant aspects, the mode criteria needed to be limited.

The mode criteria for **road transport** were:

- Sustainability requirements for sub-suppliers
- Observance of traffic regulations (speed limits, load securing, drink-driving etc.)
- Resting times and working hours of the drivers

Most of the road suppliers use sub-suppliers in their transport and therefore it is no use for monitoring only official suppliers. In addition to sustainability requirements, the suppliers were asked how they monitor that sub-suppliers really fulfil their requirements. They were also asked whether they monitor that the drivers follow the speed limits and are drug-free, bind the load appropriately, and ensure the common traffic safety. The idea with the open question was to point out how much the suppliers are really considering these aspects. Finally, the observance of the drivers' resting times is a real problem at the traffic. Yet, it is easy to monitor electronic driver's logs and total working hours of the drivers.

In general, rail transport has managed sustainability aspects well but it could still afford improvements. The most important sustainability criteria for **rail transport** were considered as:

- Work for reducing energy consumption
- Observation of traffic and work safety
- Environmental training for the staff

The work for reducing noise and vibration were included into the common question of emission reductions. In addition to emissions, rail transport consumes much energy and should thus monitor ways for reducing the consumption. Safety at work and traffic safety can be considered important as rail transport relates to groups of people. For the same reason it is necessary to make sure that all employees have relevant environmental training.

The mode criteria for **European sea transport** were:

- Waste disposal on board ship and at ports
- Sustainability requirements for sub-suppliers
- Monitoring the safety of the fleet

The suppliers were expected to report their fuel usage in the common question of emission reductions. Also, there are numerous cases showing that waste disposal of ships have not always been handled appropriately. The sea suppliers were therefore asked to describe their waste disposal system both on board ship and at ports. The sea suppliers also use sub-suppliers and hence it was necessary to ask about their sustainability requirements. Finally, the safety of the fleet was considered among the third most important aspects that need to be monitored. Also the working conditions were considered important but as the number of questions needed to be limited to ten, it was left out this time. However, it could be included into the questionnaire next year.

The mode criteria for **port operations** were:

- Monitoring the safety at work
- Work for reducing energy consumption
- Waste disposal (especially hazardous waste like oil and tires)

The most important sustainability aspect with port operations is the safety at work as the risk for injuries is significant. Also emissions and large energy consumption have considerable environmental effects. In addition, port operations produce rather much hazardous waste, such as tires and oil, which need to be treated correctly. The work for reducing noise and dust can be included in the common question of emission reductions.

5.2.2 Testing the Tool

In this section the functionality of the categorisation tool is tested. The idea is not to create an extensive portrayal of the present sustainability situation in the market but to test whether the tool works and shows appropriate supplier groups for individual suppliers.

The sustainability questionnaires presented in the Section 5.1 were sent to 27 suppliers from different transport modes in the language that they preferred (Finnish, Swedish or English). The response rate was 100 % and 25 suppliers responded within two weeks although the questionnaire was sent to them at the beginning of July. The sample consisted of 15 road suppliers from different size categories, 2 rail suppliers, 5 sea suppliers, and 5 port operators, of which 2 were from the inland. Most of the respondents were from Finland and Sweden, while a couple of them were from the Central Europe.

The suppliers were asked to answer ten questions of which three questions were mode specific. Each question was equally weighted as the purpose was to outline how much the suppliers have worked with sustainability and whether the categorisation tool divides suppliers correctly. Due to the same reason the class limits were defined by dividing the maximum score, 5, roughly into thirds. However, as Stora Enso adapts this framework, it should consider whether it is needed to give different weights for the questions and whether it wants to disperse suppliers more evenly. As discussed earlier, another option for categorising would be to locate for example 33 % to the experience group of the Novices, 34 % to the Intermediates, and 33 % to the Leaders. Anyhow, the upper class limits in this categorisation were:

- 1.7 points for the experience group of the Novices
- 3.4 points for the Intermediates
- 5 points for the Leaders

The tool testing proved that to ensure the best usability of the questionnaire, it is indeed necessary to have both open part and multiple-choice part in it. The multiple choice questions accelerated the handling of certain questions as it was possible to see, for example, that a supplier has an environmental certificate and to check that they have attached the copy of the policy. The testing also confirmed the assumption that the suppliers do have very different conceptions on the decent sustainability level. Whereas one supplier considered they have worked much with sustainability as they implemented the legal requirements of environmental authorities, another supplier was really careful when estimating its own advanced sustainability performance. Besides, the open questions did provide a good outlook of the current sustainability work within an industry and gave good ideas for the case company of how it could ask the suppliers to enhance their operations. Hence, it is very reasonable to include the open questions in the questionnaire.

The enquiry showed that almost every supplier has done at least some environmental work and many suppliers have even worked hard with sustainability issues. In general, environmental work was still more common than social responsibility work, which is still rather new trend in the business. The attitude towards the enquiry was really positive with most of the suppliers and at least understanding with some suppliers. However, when Stora Enso will officially launch these enquiries, it is necessary to point out that the assessments will be done only on the basis of the answers. This time it happened that a supplier sent three thick manuals basically saying: "You can find the answers from here." It is also not enough that a supplier has once been

certified against ISO 14001 but it needs to describe for example the general improvement that it has achieved during the previous year. This question was informative and proved to be an efficient discriminator of the suppliers. It also showed that some of the suppliers are maybe too satisfied with their obtained certificate and have become more passive in their sustainability work. Table 5-2 shows the number of the suppliers from different transport mode that were categorised into different experience groups.

Table 5-2 Distribution of the suppliers in a class

Mode	Number of Suppliers in a Class			Total
	Novices	Intermediates	Leaders	
Road	2	8	5	15
Rail	0	0	2	2
Sea	0	0	5	5
Port	0	3	2	5
Total	**2**	**11**	**14**	**27**

Figure 5-1 illustrates the percentual distribution of the suppliers to different experience groups.

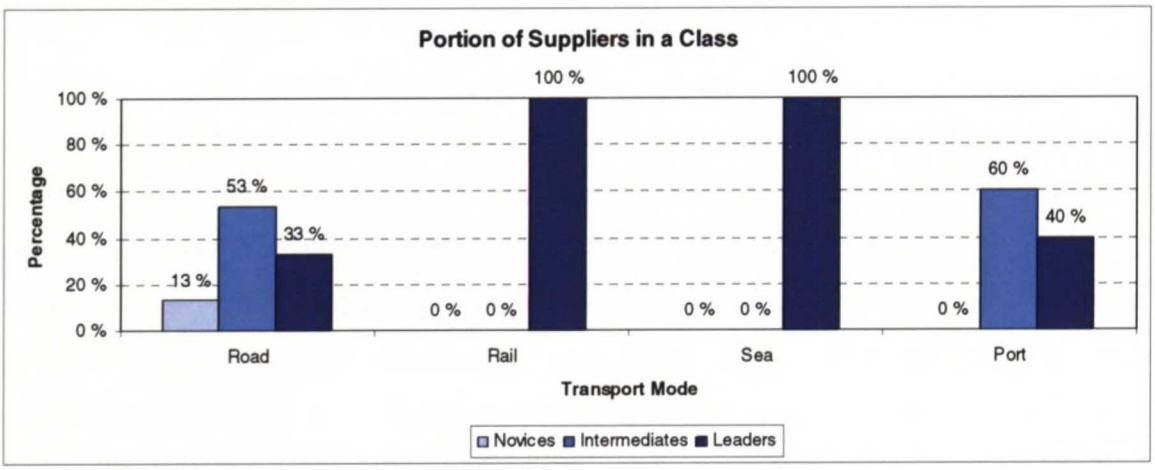

Figure 5-1 Proportional distribution of the suppliers in a class

As seen in the above figures, there are no rail or European sea suppliers in the experience groups of the Novices or the Intermediates. This is due to the special features of the transport modes. First, the rail and sea suppliers are all large and thus they face a stronger pressure to work with sustainability issues. Second, both rail and sea transports are rather well regulated by the laws. Third, the sustainability performance of the examined suppliers was really close to their rivals and there were not big differences in their environmental work. Thus, all the examined rail suppliers and European sea suppliers belong to the same experience group with their competitors and are managed as entities. This, however, eases the work of Stora Enso as it does not need to define sustainability targets for many experience groups per transport mode. In the future, the

company could consider whether it wants to change the questions or the scaling to achieve variations between the suppliers. Table 5-3 presents the general results of the enquiry.

Table 5-3 Results of the enquiry

	Road	Rail	Sea	Port
Average	3,21	4,50	4,44	3,20
Min.	0,90	4,40	4,30	2,00
Max.	4,40	4,60	4,70	4,50

Unlike in rail and sea transport, there is a large distribution between the competitors in road and port industry. In road transport this is partly explained with the size of the suppliers but there is also quite a significant difference in sustainability experience of small suppliers. However, in the sample there was a road supplier with three lorries that was registered against ISO 14001 so this is not only a question of size. But in general, experience group categorising is most needed in road transport and port operations.

As discussed earlier, the updated sustainability questionnaires consist of the common and mode specific parts. To compare the suppliers' sustainability performance between different transport modes, the common questions were taken into consideration. As mentioned earlier, the questions were scored between 0 to 5 points. Table 5-4 depicts the results of the comparison of transport modes in the general questions.

Table 5-4 Comparison of the suppliers on the basis of the common questions

	Average grade of the mode				
Common questions	**Road**	**Rail**	**Sea**	**Port**	**Average**
CSR Policy	1,4	2,5	1,8	0,4	1,5
Employee satisfaction	3,1	5,0	5,0	4,2	4,3
Environmental certificate	3,5	5,0	5,0	2,4	4,0
Environmental Management System	4,1	5,0	5,0	2,4	4,1
Environmental policy	4,1	5,0	5,0	2,4	4,1
General improvement	3,1	3,5	3,8	3,2	3,4
Reduction of emissions	4,2	4,5	4,6	4,6	4,5
Average	**3,4**	**4,4**	**4,3**	**2,8**	**3,7**

When comparing all the suppliers in terms of their results from the common part of the sustainability questionnaire, the differences are clear: rail and short sea suppliers are clearly more advanced in their sustainability work than the road and port suppliers. However, it is important to notice that many of the short sea suppliers have certified only their offices although the environmental strain of their operations is mainly caused by the vessels. Thus, it would be necessary to extend the question of certificates to apply the vessels as well. Also the road and port suppliers differed rather much from one another. This is partly due to the larger road

suppliers who succeeded well in the enquiry. Nevertheless, the port operators are not that small companies and therefore it is interesting that they have not waken up more to sustainability improvements. But one needs to remember that the small port sample was not valid for representing all the port suppliers. When comparing the questions together, one can notice that the suppliers have worked most with emission reduction and employee satisfaction. Most of the logistics service providers under estimation do not have a CSR policy. But again, the samples of rail, short sea, and port suppliers do not statistically represent all the suppliers from the industries.

When comparing the suppliers' success in mode specific questions, the differences are still distinct. Yet, one needs to perceive that the questions were not similar for different transport modes and their level may not have been the same. The averages of mode specific questions were:

- 2.9 points for the road suppliers
- 4.8 points for the rail suppliers
- 4.7 points for the short sea suppliers
- 4.1 points for the port suppliers

Figure 5-2 depicts the ranking of the logistics service providers when comparing their success in the common questions and in the mode specific questions.

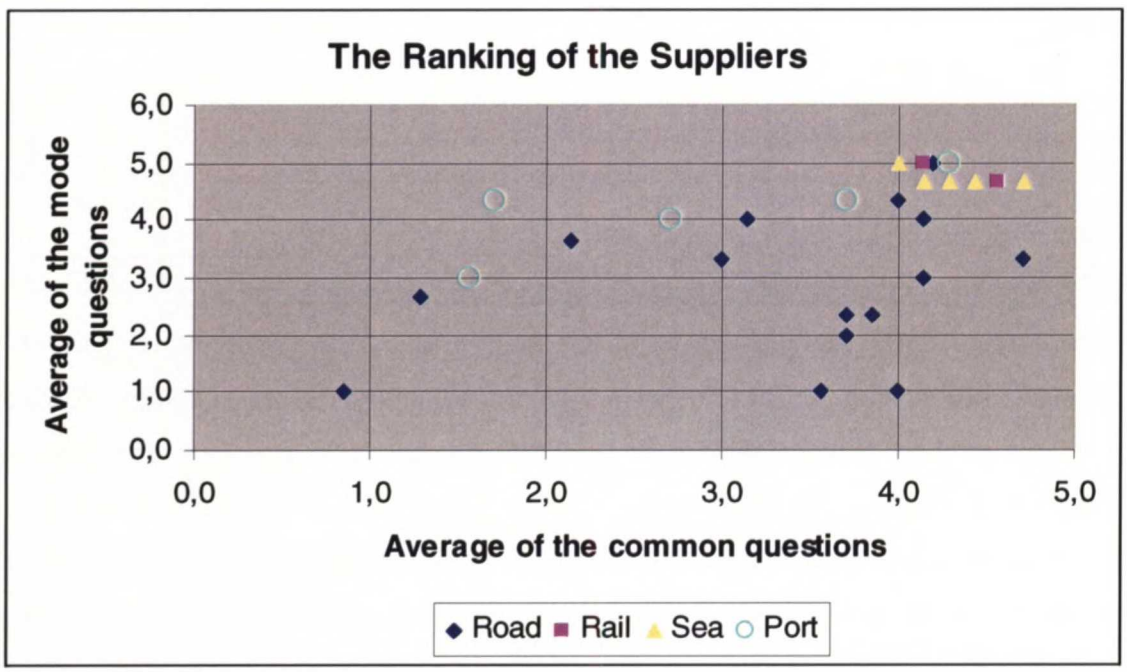

Figure 5-2 Ranking of the suppliers when comparing the averages

As discussed earlier the dispersions of the scores of the road and port suppliers are strong. Figure 5-2 illustrates the dispersions of the road and port suppliers as well as shows how the short sea and rail suppliers are concentrated to the right top corner. The dispersion of the road and port suppliers is strong both in the common and in the mode specific questions. Hence, the original hypothesis proved to be true: the road and port suppliers really need different guiding methods on the basis of their transport mode and suppliers' size. However, the study did not prove that large transport companies are unambiguously more advanced in their sustainability performance. The size of a supplier increased the possibility of advanced sustainability performance but there were also some small companies that succeeded rather well in the study as well as some larger companies that were passive in their sustainability work. But one needs to notice that the sample of the suppliers was not extensive and therefore the results were only suggestive. Nevertheless, the differences of the results are that clear that also small road transport suppliers should wake up to sustainability improvements. If sustainability is to be used as a decision criterion in contract negotiations, passive suppliers are easily threatened by their active competitors. Not all sustainability improvement procedures require significant resources and investments.

To ensure that the categorisation tool classifies the logistics service providers correctly, sensitivity analysis was carried out by altering the weights of the criteria. However, the number of the criteria remained the same so the weights of the pre-defined criteria were more than zero. Table 5-5 presents the weights of the criteria during the first round of sensitivity analysis. The emphasis of the criteria was on environmental certificates and existence of the policies. The common questions encompassed 80 % of the weights while the mode questions that were more performance oriented were given only 20 % of the weights.

Table 5-5 Weights of the first sensibility analysis

Weights of the questions			
Common questions (80 %)		**Mode questions (20 %)**	
CSR Policy	0,1	Traffic safety / safety at work	0,05
Employee satisfaction	0,05	Reduction of energy	0,1
Environmental certificate	0,2	Waste disposal	0,05
Environmental Management System	0,15	Monitoring of sub-suppliers	0,1
Environmental policy	0,15	Environmental training	0,05
General improvement	0,05	Working hours	0,05
Reduction of emissions	0,1		

Table 5-6 depicts the result of the categorisation that concentrated on the existence of certificates and policies. When comparing the result to the original classification, especially the experience class of the Leaders is larger. In other words, some suppliers succeeded better in the evaluation if Stora Enso would settle only for ensuring that the logistics service providers are certified and

have defined their policies. The current sustainability performance of the suppliers is not that vivid, as they have relied on the existence of the certificates. At the same time, small logistics service providers do not succeed well in the sustainability estimation that concentrates on the certificates. Although a small supplier may perform rather ethically, it cannot necessarily afford buying certificates. Therefore, this sensitivity analysis favoured medium-sized and large logistics service providers.

Table 5-6 Result when emphasising certificates and policies

Mode	Number of Suppliers in a Class			Total
	Novices	Intermediates	Leaders	
Road	2	4	9	15
Rail	0	0	2	2
Sea	0	0	5	5
Port	1	2	2	5
Total	**3**	**6**	**18**	**27**

But what happens to the results if the emphasis is given to continuous improvement? In the second sensibility analysis the emphasis of certificates and policies was significantly lower as the analysis concentrated on actual sustainability performance. The emphasis of the common questions was now 65 % whereas the mode criteria were given 35 % of the weights. Table 5-7 presents the weights of the second sensibility analysis.

Table 5-7 Weights of the second sensibility analysis

Weights of the questions			
Common questions (65 %)		**Mode questions (35 %)**	
CSR Policy	0,05	Traffic safety / safety at work	0,15
Employee satisfaction	0,1	Reduction of energy	0,1
Environmental certificate	0,05	Waste disposal	0,1
Environmental Management System	0,1	Monitoring of sub-suppliers	0,1
Environmental policy	0,05	Environmental training	0,1
General improvement	0,2	Working hours	0,1
Reduction of emissions	0,1		

The second sensibility analysis enabled also small suppliers to succeed in the sustainability assessment. Table 5-8 depicts the result of the analysis when emphasising continuous sustainability performance rather than certificates. When comparing the result with the original analysis, the experience group of the Leaders is again a bit larger. This means that certain suppliers perform rather ethically but they may not have defined policies and procedures for their sustainability performance. Yet, it is important to notice that also small suppliers could easily define their own environmental and social policies and management systems in order to increase the systematic approach of the improvement process. The result of the second sensibility analysis is much closer to the original assessment than the result of the first sensibility analysis. In other

words, should Stora Enso concentrate on continuous improvement instead of certificates and policies, the result were close to the original analysis with equal weights.

Table 5-8 Result when emphasising continuous performance

Mode	Number of Suppliers in a Class			Total
	Novices	Intermediates	Leaders	
Road	1	8	6	15
Rail	0	0	2	2
Sea	0	0	5	5
Port	0	2	3	5
Total	**1**	**10**	**16**	**27**

On the basis of the sensibility analyses it can be stated that the categorisation tool classifies suppliers correctly. The results of the categorisations remained approximately similar in spite of the criteria weights. However, the original analysis proved to be the best for the purpose as it balanced the systematic approach of certificates and policies as well as the approach of continuous improvement. When comparing the results that were received on the basis of the updated questionnaires to the results with the previous questionnaire, the difference is clear: the updated version gives more accurate and full information than the previous questionnaire. Also, the suppliers are more easily to be compared with each other, as the grading is similar to all logistics service providers.

If Stora Enso wants to divide its logistics service providers more evenly to the experience groups, it should use large supplier base to ensure the statistical dispersion. As all other samples but the sample of the road suppliers were too small for this categorisation, only the road suppliers were divided into even experience groups. The suppliers were estimated with the help of categorisation tool and they received a weighted score as a result of the assessment. The scores were then ranked with each other and the suppliers were divided into thirds on the basis of their superiority. As two suppliers had the same limit score, the experience group of the Intermediates grew little larger than the others. Thus, the upper class limits of the experience groups when dividing the road suppliers equally into experience classes were:

- 2.8 points for the experience group of the Novices (27 % of the suppliers)
- 3.8 points for the Intermediates (46 % of the suppliers)
- 5.0 points for the Leaders (27 % of the suppliers)

The upper class limits were significantly higher than the class limits of the original analysis, especially the limit of the Novices. The suppliers were now divided equally to the groups whereas the original analysis just outlined how much the suppliers have approximately worked

with sustainability. However, this equal categorisation may be useful after the beginning of the sustainability process in order to encourage the suppliers to compete more with their ranking.

Due to different conceptions of decent sustainability level and suppliers' conscientiousness towards the enquiry, the purchasers that estimate the responses need to bravely revalue the answers when needed. In the categorisation tool there is a separate field for comments that is meant to be used in these cases. The revaluation is also eased by the fact that the suppliers cannot see the grading from the questionnaires that are sent to them so the purchasers can modify the scores on the basis of their conceptions of the suppliers' general sustainability level. Figure 5-3 presents a sustainability estimation of a road supplier that was a little bit too approximate with the answers.

Company: Example Road Company

Criteria	Weight	Grade	Weighted Grade
Bunker / Fuel type	0	0	0
Communication	0	0	0
Community involvement	0	0	0
Corporate Social Responsibility policy	0,1	5	0,5
Diversity	0	0	0
Employee satisfaction	0,1	5	0,5
Engine type	0	0	0
Environmental certificate	0,1	0	0
Environmental management system	0,1	5	0,5
Environmental policy	0,1	5	0,5
Environmental training for the staff	0	0	0
Fleet condition	0	0	0
Free choice of employment	0	0	0
Freedom of association	0	0	0
General improvement	0,1	2	0,2
Monitoring of child labour usage	0	0	0
Monitoring of traffic safety / safety at work	0,1	3	0,3
Monitoring of working hours	0,1	0	0
Noise and vibration reduction	0	0	0
Reduction of energy consumption	0	0	0
Reduction of emissions	0,1	4	0,4
Remuneration	0	0	0
Sustainability monitoring of sub-suppliers	0,1	3	0,3
Training for eco-driving	0	0	0
Waste disposal	0	0	0
Working conditions	0	0	0
Total	1,00		3,2

Count!

Print

Clear

Supplier level: 2

Comments:

- The work for reducing emissions is not that significant that the work of the rivals of the company. Hence, the grade should be lower (4).
- The company has not achieved significant improvements during the year, all were explained already in the 2003 report -> the grade will be dropped to 2.
- The company does not monitor the working hours! It is not enough that this is only included into the contract terms.

Figure 5-3 Example of sustainability assessment of a supplier

The Figure 5-3 illustrates the sustainability assessment of a supplier. A purchaser has given equal weights for the pre-defined criteria and has estimated the sustainability performance of a supplier on the basis of the enquiry response. Yet, the sustainability conceptions of the supplier differ from the conceptions of the purchaser, so the purchaser has changed a couple of scores to get the suppliers' result in line with its rivals and written the argumentation to the comment field. Thus,

the categorisation tool shows that a supplier belongs to the experience group of the Intermediates (level 2).

As the suppliers' conceptions of the decent sustainability level vary, Stora Enso needs to explain after the enquiry the suppliers what kind of performance was expected for certain experience level. In addition, the results of the assessment should be published for all logistics service providers of a manufacturing company in order to create an incentive for improvements. Hence, logistics service providers would get ideas on how they could improve their operations as well as where they are located in terms of their rivals. In other words, the release of the results could offer the suppliers a brief training of sustainability aspects that could also increase their commitment to development.

To improve the test questionnaire, the traffic safety question in the road enquiry should be reshaped to resemble the question of the environmental and social responsibility achievements. The traffic safety question had too many aspects compared to the amount of alternatives and, thus, the suppliers often concentrated only on the load securing as it is the most common aspect to be monitored. Therefore, the number of multiple-choice alternatives should be increased and the open question should ask suppliers to identify the procedures from every traffic safety aspect. In addition, the answer alternatives of the waste disposal question in the port enquiry should be refined to describe more accurate levels for waste disposal. Also the common question of emission reductions should be extended to cover noise and dust reduction in the port enquiry.

5.2.3 Commitment to Change

To encourage the suppliers to develop their operations and similarly Stora Enso's corporate brand, Stora Enso needs to be prepared to offer incentives for them. Although these incentives cost something, the company should weigh the value of the positive reputation it can gain with the improvement programme. Further, the company should consider possible alternatives for really taking advantage of its pioneer position. For example a logistics company DHL has launched a totally new product called "Green Tonnage" and thus adds extra value for their customers. Nevertheless, paper is a bulk product and its customers are not willing to pay much extra of the green transport. But when two paper companies are even at the competition, the customer may choose the company that has more ethical reputation.

Stora Enso needs to consider its role in the sustainability improvement process. Due to its strong position in the transport chain it can either dictate the new requirements and targets or it can co-

operate with the suppliers when negotiating the experience group requirements that are discretionary and thus negotiable. The latter method is more likely to create commitment and enthusiasm among the suppliers and may therefore lead to more effective improvement.

Due to the profit improvement programme, Stora Enso does not intend to make remarkable investments in the suppliers' incentives on the sustainability programme. Hence, one needs to ponder effective but inexpensive ways for committing the suppliers. The best methods for committing the suppliers are thus promises of future business and the suppliers' commitment circle that was presented in the Section 3.2.3. First, the suppliers need some kind of guarantees that they are given some lead in the contract renegotiations if they have fulfilled all the requests of Stora Enso. After all, there is no sense for a supplier to invest in the brand of a buyer company if a supplier itself does not benefit from it at all. Second, there is an existing need for intensified information sharing in the transport chain, especially with the sea transport and port operations where the purchasers of Stora Enso feel the current information exchange is not efficient enough (Stora Enso 2005f). To best increase the information sharing, the company should also increase visibility for its logistics service providers by informing them about the future intentions and expectations. It would be profitable to give some sustainability training for the Novices and the weaker Intermediates in order to ease their early development efforts. Stora Enso should also communicate efficiently on the sustainability expectations of every experience group to unify the suppliers' diverse sustainability conceptions. This would enhance suppliers' trust towards the company and further increase their visibility towards it. If Stora Enso promised some benefits for the successful suppliers who fulfil the sustainability targets, it could succeed in creating a strong relationship with firm commitment to collaboration and thus intensify the development process. As discussed earlier, the case company should also negotiate the priorities with the suppliers when considering the experience group requirements. Finally, Stora Enso could arrange annual sustainability competition for its logistics service providers. The winner could be selected on the basis of the enquiry results. The prize does not need to be very expensive if the winner is getting positive publicity and the collaboration with Stora Enso will be improved.

It is important to notice that some of the suppliers are in a very strong position and the negotiation power of SETD may be much lower in these relationships. National railways do not have serious competitors and the power of European sea transporters have grown significantly due to the new NETSS system and long contract periods. In these cases SETD may not be able to promise more volumes or threat with volume reductions. Therefore, the only ways for influencing these suppliers are basically negotiations and enhanced visibility between the

companies. However, the suppliers have traditionally been really co-operative although they do not have an immediate threat for volume reductions.

5.3 Sustainability Requirements for the Suppliers

As discussed earlier, buying companies need to specify themselves the sustainability requirements that they want to set for their suppliers. Hence, it is not possible to give an unambiguous list of the requirements that manufacturing companies should use when improving sustainability. However, the author has done some benchmarking to outline what the mode requirements and experience level requirements could be. But as already stated, this subtopic provides only suggestions that Stora Enso can use as a basis for their decisions.

5.3.1 Common Requirements

Stora Enso Environment is currently defining the minimum sustainability requirements for all the suppliers and contractors of the Corporation. The common requirements that were described in the Section 3.3.1 refer to these minimum requirements when we talk about the case company. The work for defining the common requirements is not yet finished so the new requirements cannot be presented in this thesis. However, they will cover the CSR principles of the company and the basic environmental requirements. The CSR principles of Stora Enso can be found from the Attachment 4. The basic environmental requirements will request all suppliers to familiarise themselves with the environmental and CSR policies of Stora Enso, assign environmental responsibilities within the organisation, provide information of the environmental targets and performance, educate the personnel for environmental aspects, and so on. In other words, the requirements will be very general and their intention is mainly to reduce corporate risk and define the basic guidelines for the collaboration.

5.3.2 Mode Specific Requirements

Mode specific requirements should also be considered as minimum requirements and they apply for all logistics service providers of different transport modes. They will be defined by SETD and their intention is to reduce the risk related to modes. As both common requirements and mode specific requirements are considered as minimum requirements, they will be included in the handling manual of the logistics service providers that are given for every logistics service provider to ensure the joint procedures.

One should not be too soft with the mode specific requirements. It may be necessary to give suppliers a transition period but the requirements also need to require something. In general, too

many purchasers in Stora Enso worried what happens if a supplier does not fulfil the mode requirements. A good example of this is the meeting of the purchasers where the subject was sustainability requirements. All the purchasers seemed to agree that the fleet of road suppliers should not be older than ten years in the EU. However, when later the discussion was about the standardised EURO 2 engine classification as a mode specific requirement, the purchasers became worried whether they could abandon the suppliers with EURO 1 engines. Yet, all the lorries that are built after 1996 have minimum EURO 2 engine (Maukonen 9.6.2005). As the suppliers were given a transition period, every logistics service provider would have an opportunity to develop its operations to decent level. After all, the transport purchasers unanimously considered that the fleet should not be older than ten years.

SETD should specify different mode requirements for different geographical area. Table 5-9 depicts some suggestions on what the mode specific requirements could be in the EU. However, one needs to notice that the requirements should be lowered as examining the transport in other continents.

Table 5-9 Suggestions for mode specific requirements in the EU

Road	**Rail**
Environmental:	***Environmental:***
Euro 2 engine classification	Energy consumption
Training for eco-driving	Emissions
Identification of environmental aspects	Waste disposal
Fuel consumption	Eco-driving
Emissions	Fuel type
Waste disposal	Work against noise and vibration
Corporate Social Responsibility:	Amount of diesel locomotives
Monitoring of working hours	Hazardous waste
Employee satisfaction	***Corporate Social Responsibility:***
Inspections of load securing	Sustainability training for the management
European sea transport	**Port operations**
Environmental:	***Environmental:***
x % sulphur in bunker	Identification of environmental aspects
Oil separation of bilge water	Energy consumption
Type of oils and lubricants	Emissions
Antifouling paints	Waste disposal
Emissions	Hazardous waste
Energy consumption	Catalysers
Corporate Social Responsibility:	***Corporate Social Responsibility:***
Working conditions	Safety at work
Safety on board	Sustainability training for the management
Employee satisfaction	Employee satisfaction

In the EU road transport those requirements could be for instance minimum EURO 2 engine classification and training for eco-driving for every chauffeur to decrease the fuel consumption. The suppliers could be asked to identify the most important environmental aspects, set reduction targets for fuel consumption and emissions, and sort the waste. Further, the mode specific CSR requirements could be for instance frequent monitoring of the electronic driver's logs, monitoring of employee satisfaction, and making frequent inspections of the load securing. Rail requirements in the EU could be for instance setting reduction targets for energy and emissions, sorting the waste, training for eco-driving, using the best available fuel, and reporting on the work against noise and vibration. Stora Enso could request the rail suppliers would present their plans for reducing the amount of the diesel locomotives as well as report on their waste disposal and hazardous waste. It could be asked that, for example, 25 % of the management were trained for basic sustainability matters.

European sea transport requirements could be for example 1 % sulphur in bunker in the Baltic Sea and in the North Sea transport, appropriate oil separation of bilge water, environmentally friendly oil and lubricants, as well as accepted antifouling paints. Sea transporters could also report on their emissions and energy consumption, monitor frequently working conditions and safety on board, and monitor employee satisfaction.

Finally, port operations could be asked to identify the most important environmental aspects, set reduction targets for energy consumption and emissions, report on their waste disposal and hazardous waste, use appropriate catalysers, frequently control safety at work, train 25 % of the management for basic sustainability aspects, and monitor employee satisfaction.

As one might have noticed, some suggestions for the requirements are the same in different transport modes. This is due to the fact that the minimum requirements defined by Stora Enso Environment are the same for all geographical areas. Hence, the requirements are very common and do not include any specific requirements, such as certain percentage of the management should be trained for environmental aspects. Yet, many of the mode specific requirements may be adaptable to several transport modes but has been categorised under the mode that needs it the most. For instance, environmental training for the management is categorised under rail transport as it needs to arrange appropriate procedures to prevent or reduce harmful environmental effects. In addition, it is important to distinguish the categorisation criteria and mode specific requirements from one another. The topics under the categorisation criteria are asked from the suppliers in the questionnaires and the number of them is limited to ten. The mode requirements,

for their behalf, can be related to the categorisation criteria or to completely different aspects. They tell logistics service providers the minimum requirements that they need to fulfil in order to co-operate with Stora Enso.

Many of the mode specific problems are actually defined by the law, such as load securing, resting times, and speed limits. However, it is not enough that the case company settles for including these to the contract terms, as it is not unusual that these regulations are offended. Therefore, the mode requirements reverse the burden of proof for the suppliers, meaning that they need to be able to authenticate that they actually follow the law. This is the reason why the new questionnaire asks the suppliers for example to describe how they monitor in practise that the drivers follow their legal resting times.

5.3.3 Experience Group Requirements

Unlike the common and mode requirements, the experience group requirements are meant to be suggestions and proposals for the suppliers on how they could improve their operations. The suppliers do not necessary have to implement all the requests but their sustainability improvement will be assessed in context with contract renegotiations. As the tailored requirements are not compulsory for the suppliers, they will not be included in the handling manuals.

To ensure the best development of the transport chain, the experience group requirements should be rather simple and the total number of the requirements should be limited. Thus, it is recommended that the requirements for the lowest experience group, the Novices, would be gathered from the mode requirement suggestions that were left out from the official requirements. For example, the requirements of the Novices in all transport modes could be that the suppliers would identify the most important environmental aspects, set reduction targets for emissions and energy consumption, report on waste disposal, and so on. In addition to these common requirements, the case company could add a few mode specific requirements, such as frequent monitoring of electronic driver's logs, training for eco-driving and setting sustainability requirements for sub-suppliers.

The experience requirements for the suppliers belonging to the Intermediates or the Leaders can also be modified from the mode specific requirements. Only this time the requirements will be faded up to set challenges for the supplier groups. Stora Enso can ask the suppliers to work more with sustainability than before, the targets can be higher, larger proportion of the personnel could

be trained for environmental work, and so on. Those large suppliers who belong to the experience class of the Intermediates or the Leaders but have not registered against ISO 14001 should start the project that aims at acquiring the certificate. However, as discussed earlier, it is essentially important to consider the size of a supplier with experience group requirements before the purchaser really suggests massive targets for it.

5.4 Recommendations

At the moment there are two main difficulties for successful sustainability improvement process of Stora Enso's transport chain: lack of co-ordination and lack of resources. To succeed in the sustainability improvement process, the company needs to clearly allocate responsibilities between and inside the units. The responsibility distribution is too dispersed as every country is performing differently and there are much overlapping operations also inside the countries. For example, transport contracting is both at the responsibility of the mills and the SETD in Finland, whereas in other countries the responsibilities may again be organised differently. Furthermore, both the mills and the SETD are assessing the performance of the suppliers but they do not necessarily co-operate with planning process or even know exactly what the other party is doing. Hence, the management should clearly harmonise the processes inside and between the countries and place clear responsibilities for the process. An important thing, in addition, would be to create a corporate database of the transport suppliers to ease the co-ordination of the operations as well as to define some common guidelines for the purchasers of the desirable decision criteria.

If the sustainability improvement of the transport chain is considered important in Stora Enso, the company should also allocate some resources for the process. The purchasers should have an opportunity to reject the cheapest supplier if it had not handled the sustainability aspect moderately. In other words, if the company intends to improve the sustainability of its transport chain, also its own decisions need to be sustainable and support the system.

As the sustainability should be improved in the whole transport chain, someone should take care of the global co-ordination, monitoring and measuring. The same person could co-ordinate global and local harmonisation of the processes. A good idea would also be to co-operate with Stora Enso Forest to harmonise the transport supplier estimations with raw wood transports. These arrangements would bring financial benefit for the company as the overlapping operations were removed and the processes were rationalised. However, the purchasers should somehow be enclosed with the sustainability assessment of the suppliers in order to ensure their interest in context with contract renegotiations.

The next list summarises the recommendations for the case company:

1) Definite and effective performance procedures
2) Expedient sustainability questionnaires
3) Clear sustainability requirements
4) Versatile commitment methods
5) Ensuring the successful improvement process

The first recommendation reminds that the procedures should be clearly defined so that every employee understands what he is expected to do. The procedures that will be carried out in the sustainability improvement process should be efficient and the amount of extra work needs to be reasonable. Sustainability estimation should be included in the normal supplier evaluation process and the results should affect the contract negotiations. To ensure the correct assessments, some training should be given to the purchasers who assess the sustainability performance of the logistics service providers.

The second recommendation refers to the need for updating the current sustainability questionnaire. The sustainability performance of the suppliers should be assessed with the questionnaires consisting of open questions and multiple-choice questions but the total amount of the questions should be limited. To increase the veracity of the responses, the purchasers should clearly tell the suppliers that sustainability estimation would be one decision criterion when renegotiating the contracts. The suppliers could thus invest time in their responses and consider more thoroughly the actual stage of their sustainability performance. The sustainability enquiry should be conducted annually, or once in two years if it is needed to reduce the amount of work. On one hand, sustainability improvement endeavours take time to fulfil but on the other hand, by conducting annual enquiries it would be possible to change questions. This would be possible by comparing the suppliers with one another, when it is not needed to keep the questions comparable. However, it is important to notice that the questionnaires and other procedures should not be planed too punctiliously. It is also important to achieve results so the duration of the planning process should be limited.

The third recommendation means that Stora Enso should define common requirements, mode specific requirements, and experience group requirements for the suppliers by taking the geographical location and supplier's size into consideration. Despite the multi-level requirements, the sustainability requirements for the suppliers should be concrete to ensure large acceptance of the project.

The fourth recommendation reminds that Stora Enso should consider methods for committing its suppliers into sustainability collaboration. The purchasers should have an opportunity to abandon a supplier whose sustainability performance is not at decent level. The results of the annual suppliers' sustainability estimations should be released for every logistics service provider and the case company should clearly communicate suppliers the desired sustainability procedures of different experience groups. To unify the suppliers' conceptions of decent sustainability level and encourage suppliers to improvements, some logistics service providers should be trained to the most significant sustainability aspects. Stora Enso should also increase visibility towards its suppliers by informing the future intentions and sustainability endeavours.

The fifth recommendation aims to ensure the fertile improvement conditions for the case company. The supplier base should be reduced as much as possible to ease the change management of sustainability improvement process. The transport chain processes of Stora Enso should be harmonised inside and between the countries and the collaboration between the units should be increased to reduce overlapping functions inside the organisation as well as to intensify the sustainability improvement process..

The above list contains only the results concerning the case company. The following chapter includes also the general recommendations for manufacturing companies.

6 Conclusions

As global competition is extending from individual companies to supply chains, manufacturing companies are extending their competitive talents to the supply chain level. This thesis examined how a manufacturing company could best improve the sustainability of its transport chain through enhanced collaboration and suppliers' committing to joint targets. The thesis aimed at synthesising the most relevant sustainability and management aspects of improving the sustainability of a transport chain, creating a framework for supplier classification, analysing the transport chain of the case company, and introducing a categorisation tool that purchasers could use to classify suppliers into appropriate groups and assess their sustainability performance.

6.1 Key Theoretical Findings

Improving sustainability of transport services consists of several important areas. A manufacturing company needs to decide with whom and in what ways it wants to collaborate. It needs to consider how it can monitor that the sustainability aspects are really met, how it estimates the performance of its suppliers, and what performance measures it should use. It needs to know how it can commit the suppliers into collaboration and it should know what incentives the suppliers appreciate. As the improvement projects include many aspects to be considered, also the amount of literature is remarkable. This thesis synthesised the most relevant sustainability and management aspects of the collaboration improvement projects.

To ease the change management when increasing the collaboration of the supply chain, a manufacturing company should aim to reduce its supplier base. As the manufacturing company has decided with whom it wants collaborate, it should concentrate on the relationship building. The prerequisites for successful collaboration are commitment, trust towards the other participants, and effective information exchange. Thus, a manufacturing company should focus mainly on these aspects.

Other key findings of the theoretical part were, that a manufacturing company should keep the change requirements simple and offer support for its suppliers in order to gain the best results from the improvement programme. Furthermore, suppliers expect that if a buyer sets them new requirements, it really monitors that these requirements are met and uses this information in negotiations. What comes to performance measurement system, it should combine financial, customer, internal business processes, as well as learning and growth perspectives together. In

other words, a manufacturing company should aim to comprehensive measurement and understanding, not just to estimate sustainability as a separate field. This is likely to succeed best when the sustainability assessment is combined with regular supplier evaluations. In addition, the theoretical part introduced a large variety of possible sustainability strategies, of which a manufacturing company could select the strategies that best suit for its unique features and present business situation.

The study introduced the supplier categorisation framework for manufacturing companies that intend to improve sustainability of their transport chains. In addition, the thesis presented guidelines on how the sustainability requirements for suppliers should be defined.

6.2 Key Empirical Results and Practical Implications

The basic idea for sustainability improvement in the transport chain of Stora Enso was to extend the improvement endeavours to apply every logistics service provider, so every supplier should be challenged for sustainability improvements. The amount of work should be reduced by categorising the suppliers into groups on the basis of their transport mode and earlier experience in sustainability issues. The sustainability requirements should be then tailored to meet the unique features of these groups. The thesis did not provide the case company an unambiguous list of the sustainability requirements that is should ask its suppliers to fulfil but, instead, it offered the company a list of the most common requirements from which it could pick up the most relevant requirements it wants to use. Although the basic sustainability improvement project should involve every logistics service provider, larger sustainability studies could still be performed for the key suppliers with whom the case company could also collaborate more in sustainability field.

The idea of the empirical examination in this thesis was not to create an extensive portrayal of the current sustainability situation in the market but to test the functionality of the categorisation tool. The testing proved that the categorisation tool works well in supplier classification. The tool classified the suppliers appropriately and the ranking of the suppliers remained approximately the same during the sensitivity analysis. Almost all the transport suppliers of the case company had done some sustainability work and the general attitude towards sustainability improvements was positive. It looks like the current sustainability level varies most inside road transport industry and port operations industry. The sustainability performance of the rail suppliers and the European sea suppliers was not that dispersed but the performance of the suppliers was pretty close to their rivals.

The main hypothesis proved to be correct: different transport modes with different suppliers' size really need special guiding methods due to the dispersion of their sustainability work. However, the size does not necessarily correlate with the level of suppliers' sustainability work. There are suggestions that larger transport suppliers in general may manage their sustainability better than very small suppliers but the study indicated also exceptions. Yet, the sample of the suppliers was not extensive so the results are only suggestive.

As improving sustainability of transport services can be seen as process-oriented development that aims at increasing suppliers' own abilities to develop their operations, Stora Enso should offer support for smaller suppliers at the beginning of their sustainability work. To enhance suppliers' commitment to collaboration, the company should also increase the visibility towards its suppliers. This would help the suppliers to anticipate future demands and develop their operations into the desired direction. Increased trust would thus lead to better commitment and better sustainability performance. However, at the beginning of the process Stora Enso should reconsider the amount of the transport suppliers and see whether it would be possible to reduce their number in less frequent routes.

To really achieve results in the sustainability project and to improve profitability of SETD, the company should allocate some resources for the improvement process. The supply chain processes inside and between the countries should be harmonised, the number of overlapping processes should be reduced, and co-operation between the units should be increased remarkably.

The main contribution of the thesis was an evaluation method that includes guidelines, assessment forms, and the categorisation tool. The case company was given recommendations on the procedures it should undertake and how it could carry on with sustainability improvements. The sustainability questionnaires of the suppliers were reshaped and the purchasers were given the categorisation tool for supplier classification that would help them to estimate the sustainability performance of the suppliers and that could be used in the context of contract negotiations.

6.3 Future Research

This thesis has concentrated on the change management rather than defining actual environmental and corporate social responsibility (CSR) aspects that should be taken into consideration when improving the sustainability of a transport chain. The CSR aspect is still

rather new trend in the business and it offers many interesting research targets especially when considering the measurement and evaluation of social responsibility performance. As the CSR principles are often included in the laws or they are defended by the public opinion, it is difficult to create a measuring system that points out possible violations against them. It would be necessary to examine how manufacturing companies could ensure that sustainability requirements are met especially in the other continents.

As to measuring systems, it is needed to examine practical and efficient ways for combining sustainability aspect into a real decision making process. The information gathered by a measuring system needs to be realistic and veracious in order to be used as a decision criterion. Moreover, is the system able to gather comprehensive information on the critical changes in the industry? And how can a purchaser separate critical changes from less vital changes with a help of monitoring system? It could also be necessary to compare the quantitative methods and tools that are used to help the decision making process when sustainability is one decision criterion. For example, the usage of multi-criteria analysis could provide a useful help for contract negotiations.

Finally, it would be necessary to find out how the CSR recommendations are successfully implemented at every level of organisations. Officially companies do not discriminate any of their employees. Yet, there is, as an example, a significant difference between the number of male managers and the number of female managers. After all, it is a question of influencing the attitudes of every individual in the organisation.

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ATTACHMENT 1

Supplier Categorisation Tool

Company: _____

This estimation is made by: _____

Criteria	Weight	Score	Weighted Score
Bunker / Fuel type	0	0	0
Communication	0	0	0
Community involvement	0	0	0
Corporate Social Responsibility policy	0	0	0
Diversity	0	0	0
Employee satisfaction	0	0	0
Engine type	0	0	0
Environmental certificate	0	0	0
Environmental management system	0	0	0
Environmental policy	0	0	0
Environmental training for the staff	0	0	0
Fleet condition	0	0	0
Free choice of employment	0	0	0
Freedom of association	0	0	0
General improvement	0	0	0
Monitoring of child labour usage	0	0	0
Monitoring of traffic safety / safety at work	0	0	0
Monitoring of working hours	0	0	0
Noise and vibration reduction	0	0	0
Reduction of energy consumption	0	0	0
Reduction of emissions	0	0	0
Remuneration	0	0	0
Sustainability monitoring of sub-suppliers	0	0	0
Training for eco-driving	0	0	0
Waste disposal	0	0	0
Working conditions	0	0	0
Total	0,00		0

Count!

Print

Clear

Supplier level:

Comments:

ATTACHMENT 2-1

Current Environmental Questionnaire of Stora Enso

QUESTIONNAIRE INFORMATION

Supplier	-
Questionnaire	Environ., health and safety. 2005/1.0
Language	English
Score	-
Total Score	18
Passing Score	10

QUESTIONS (0/0)

(A) Overall questions **(0/0)**

1 Have the environmental aspects of your business been identified?
- ☐ Yes (1)
- ☐ No (0)

2 If "Yes", what are the significant environmental aspects?

(B) Environmental management status **(0/0)**

3 Are you registered against a recognized environmental management system?
- ☐ Yes (1)
- ☐ No (0)

4 If "Yes", which management system (No and year)? Then continue to section (D).

5 If "No", is the Company planning to introduce a certified environmental management system in the next two years?
- ☐ Yes (1)
- ☐ No (0)

(C) Environmental management **(0/0)**

6 Is there an environmental policy, signed by senoir management within the company?
- ☐ Yes (1)
- ☐ No (0)

7 Is there a person from senior management, who is actively working with environmental management?
- ☐ Yes (1)
- ☐ No (0)

8 Do you have instructions for emergency preparedness and response?
- ☐ Yes (1)
- ☐ No (0)

9 Do you include environmental management in your selection criteria when assessing and selecting suppliers?
- ☐ Yes (1)
- ☐ No (0)

(D) Fulfilment of legal requirements **(0/0)**

10 Has the Company been convicted in any environmental lawsuit in the last 5 years?
- ☐ Yes (neg)
- ☐ No (-)

ATTACHMENT 2-2

11 Is there any environmental lawsuit in process/about to commence in which the Company is a party?

- ☐ Yes (neg)
- ☐ No (-)

12 Is there a system in place to ensure all applicable environmental legislation is understood and followed

- ☐ Yes (1)
- ☐ No (0)

(E) Environmental programmes **(0/0)**

13 Is there a system (instructions, training and follow-up) in place to minimize fuel/energy consumption in operation?

- ☐ Yes (1)
- ☐ No (0)

14 Is there a system in place for substitution of chemicals and consumer goods which are, or might be, dangerous/hazardous to health or the environment? (ex. fuels, hydraulic oils, paint, cleaning chemicals etc)

- ☐ Yes (1)
- ☐ No (0)

15 Does the Company own, or operate, vehicles run by renewable fuel/energy?

- ☐ Yes (1)
- ☐ No (0)

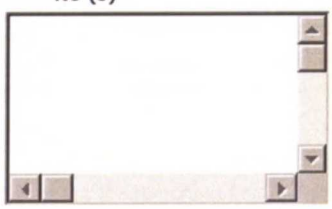
16 Does the Company actively support any project/program for the development and use of renewable energy sources in transportation?

- ☐ Yes (1)
- ☐ No (0)

17 Is there any other field where you believe your Company exceeds environmental standards and legislation?

- ☐ Yes (1)
- ☐ No (0)

18 If "Yes", please give examples:



(F) Health and safety programs **(0/0)**

19 Is there a system in place to secure the abidance of instructions for personal safety? (actions and use of safety equipment)

- ☐ Yes (1)
- ☐ No (0)

20 Is there a system in place to secure the operators abidance by traffic (road/rail/sea) regulations?

- ☐ Yes (1)
- ☐ No (0)

21 Is there a system in place to secure the abidance by working/resting time regulations?

- ☐ Yes (1)
- ☐ No (0)

22 Is there a system in place to prevent the use of drugs and alcohol on duty?

- ☐ Yes (1)
- ☐ No (0)

(S) Overall questions **(0/0)**

23 Is the Company prepared to supplement the answers to the questionnaire with further information, if required?

- ☐ Yes (1)
- ☐ No (0)

ATTACHMENT 3-1

Updated version of the Sustainability Questionnaire

Common part:

1. Does your company have an environmental policy signed by the senior management?

a	Yes	5 p.
b	No, but we are planning to create it within 1 year	2 p.
c	No	0 p.

If you chose the alternative a, please attach a copy of your policy or add the link to your policy if it can be found from the Internet:

2. Does your company have a Corporate Social Responsibility policy signed by the senior management?

a	Yes	5 p.
b	No, but we are planning to create it within 1 year	2 p.
c	No	0 p.

If you chose the alternative a, please attach a copy of your policy or add the link to your policy if it can be found from the Internet:

3. Does your company have an environmental management system (EMS)?

a	Yes	5 p.
b	No, but we are planning to create it within 1 year	2 p.
c	No	0 p.

If you chose the alternative a, please describe the most important environmental aspects of your performance as well as short-term (annual) and long-term targets:

4. Does your company have an environmental certification?

a	Yes	5 p.
b	No, but we are planning to be certified within 2 years	2 p.
c	No	0 p.

If you chose the alternative a or b, please identify the certificate:

ATTACHMENT 3-2

5. How much has your company worked to improve environmental or socially responsible performance during the previous year?

a	We have worked hard both in environmental and sustainable issues	5 p.
b	We have worked hard in environmental issues	4 p.
c	We have achieved some improvements in environmental/sustainable field	3 p.
d	We have worked to improve sustainability but have not yet achieved results	2 p.
e	We have not made any sustainability improvements this year	0 p.

If you chose the alternative a, b or c, please identify the most significant achievements of your company during the previous year:

6. Does your company aim at reducing emissions of your operations? *(rail: includes noise and vibration)*

a	Yes, we work continuously at several fields to reduce emissions	5 p.
b	Yes, we work continuously at certain fields	4 p.
c	Yes, we make occassional improvements	3 p.
d	No, but we are planning to start the emission project	1 p.
e	No	0 p.

If you chose the alternative a, b or c, please identify some concrete actions that you have taken:

7. Does your company monitor employee satisfaction?

a	Yes, regularly	5 p.
b	Yes, occassionally	3 p.
c	No	0 p.

If you chose the alternative a or b, have you made any improvements on the basis of the results?

Road questions:

1. Does your company set environmental and/or socially responsible criteria for your suppliers?

a	Yes, for all	5 p.
b	Yes, for most suppliers	4 p.
c	Yes, for some most important suppliers	3 p.
d	No, but we are planning to start monitoring	1 p.
e	No	0 p.

If you chose the alternative a, b or c, please describe how does your company ensure that your suppliers fulfill the requirements:

2. Does your company monitor that traffic safety regulations are followed in practise? (Speed limits, load securing, drink-driving etc.)

a	Yes, continuously	5 p.
b	Yes, occassionally	3 p.
c	No	0 p.

If you chose the alternative a or b, please describe how do you monitor this in practise:

3. Does your company frequently monitor the resting times and working hours of the drivers?

a	Yes, continuously	5 p.
b	Yes, occassionally	3 p.
c	No	0 p.

If you chose the alternative a or b, please describe how do you monitor this in practise:

Rail questions:

1. Does your company aim at reducing energy consumption?

a	Yes, we work continuously at several fields to reduce energy consumption	5 p.
b	Yes, we work continuously at certain fields	4 p.
c	Yes, we make occassional improvements	3 p.
d	No, but we are planning to start monitoring the usage of energy	1 p.
e	No	0 p.

If you chose the alternative a, b or c, please describe the concrete actions that you have taken to reduce energy consumption:

2. How often does your company monitor that traffic and work safety regulations are followed?

a	Continuously	5 p.
b	Occassionally	3 p.
c	Never	0 p.

If you chose the alternative a or b, please describe your safety indicators and targets:

ATTACHMENT 3-4

3. Does your company ensure that relevant employees are aware of your environmental policy, targets and procedures?

a	Yes, regularly	5 p.
b	Yes, occassionally	3 p.
c	No	0 p.

If you chose the alternative a or b, please describe how do you ensure this in practise:

Short sea questions:

1. Does your company set environmental and/or socially responsible criteria for your suppliers?

a	Yes, for all	5 p.
b	Yes, almost for all	4 p.
c	Yes, for some most important suppliers	3 p.
d	No, but we are planning to start monitoring	1 p.
e	No	0 p.

If you chose the alternative a, b or c, please describe how does your company ensure that your suppliers fulfill the requirements:

2. How does your company manage waste disposal on board ship and at ports?

a	We are taking excellent care of our waste disposal	5 p.
b	Our waste disposal is at normal level	3 p.
c	We have some imperfections in our waste disposal	0 p.

Please describe how your waste disposal is taken care of in practise:

3. How often does your company monitor and evaluate safety of the fleet?

a	Continuously	5 p.
b	Occassionally	3 p.
c	Never	0 p.

If you chose the alternative a or b, please describe your safety indicators and targets:

Port questions:

1. Does your company aim at reducing energy consumption?

a	Yes, we work continuously at several fields to reduce energy consumption	5 p.
b	Yes, we work continuously at certain fields	4 p.
c	Yes, we make occassional improvements	3 p.
d	No, but we are planning to start monitoring the usage of energy	1 p.
e	No	0 p.

If you chose the alternative a, b or c, please describe the concrete actions you have taken to reduce energy consumption:

2. How does your company manage waste disposal? (Especially hazardous waste like oil and tires)

a	We are taking excellent care of our waste disposal	5 p.
b	Our waste disposal is at normal level	3 p.
c	We have some imperfections in our waste disposal	0 p.

Please describe how your waste disposal is taken care of in practise:

3. How often does your company monitor and evaluate working safety?

a	Continuously	5 p.
b	Occassionally	3 p.
c	Never	0 p.

If you chose the alternative a or b, please describe your safety indicators and targets:

ATTACHMENT 4-1

The Stora Enso Principles for Corporate Social Responsibility

Stora Enso is global, local and responsible

Stora Enso's aims are long-term profitability and value creation through business excellence.

Respect for the individual and responsibility in business are important in running and developing our company. That applies especially to our participation in ongoing structural changes in the forest products industry.

We comply with the principles of sustainable development, including social, environmental and economic aspects.

Stora Enso follows the Principles of Corporate Social Responsibility and we expect our stakeholders to do the same.

Contents

Business Practice

- Cooperation between Stora Enso and our stakeholders shall be open-minded, fair and based on equal terms.
- Practices defined as bribes, kickbacks, price-fixing and similar behaviour are prohibited.
- Employees must avoid conflicts of interest between their private financial activities and the conduct of company business.
- All business transactions on behalf of Stora Enso must be reflected accurately and fairly in the accounts of the company.

Communication

Communication is based on credibility, responsibility, pro-activity and interaction. These apply equally to all stakeholders. We advocate an open dialogue.

Community Involvement

We shall be a responsible member of the communities in which we operate through focused partnerships at local, national and global levels. We encourage our employees to take part in the local community work.

Reduction in Workforce

Any reduction necessary in the workforce shall be carried out with respect for the individual and proper sensitivity to employees' needs.

We support the UN's Universal Declaration on Human Rights and the core conventions of the International Labour Organization (ILO), from which Stora Enso has derived the following principles:

Working conditions

Our employees are entitled to safe and healthy workplaces. No employee shall be subject to any physical, psychological or sexual harassment, punishment or abuse.

Diversity

We recognize diversity as a strength. Discrimination against any employee in respect of race, ethnic background, gender, disability, sexual orientation, religion, political opinion, maternity, social origin or similar characteristic is prohibited.

Freedom of association

Employees have the right to organize, join associations and bargain collectively, if they wish to.

Free choice of employment

Any form of involuntary labour is prohibited.

ATTACHMENT 4-3

Child labour

Use of child labour is not permissible. The minimum age for employment shall be in accordance with the ILO convention (14 or 15 years) or the age specified by local legislation if higher. The employment of young persons shall not jeopardize their education or their development.

Remuneration

Wages shall be paid direct to the employees. Employees shall be paid at least the minimum legal wage or the wage specified in an applicable collective labour agreement.

Working hours

Working hours shall not exceed 48 hours and overtime 12 hours per week on average over a year, unless other conditions are specified in local laws or an applicable collective labour agreement.

Integrating the Corporate Social Responsibility Principles into the organization

Stora Enso is included in the major sustainability indexes, which reflects our strong performance today. We recognize that it will take some time to make the Corporate Social Responsibility Principles an integral part of all our operations. We are committed to evaluating our strengths and weaknesses on an ongoing basis with the goal of continuous improvement.

Our employees shall take responsibility for integrating these principles into their dayto-day activities and we expect our stakeholders to do the same.

We believe in cooperation with our stakeholders to achieve workable solutions in each individual case. We invite our stakeholders to share their knowledge and experience.

We respect cultural differences and other factors that may vary from country to country, but we will not compromise on our Principles of Corporate Social Responsibility.